Electric Railway Journal

A CONSOLIDATION OF STREET RAILWAY JOURNAL AND ELECTRIC RAILWAY REVIEW

Vol. XXXIX NEW YORK, SATURDAY, MARCH 23, 1912 No. 12

PUBLISHED WEEKLY BY

McGraw Publishing Company

JAMES H. McGRAW, Pres. C. E. WHITTLESEY Sec'y and Treas.
239 West 39th Street, New York

TELEPHONE CALL: 4700 BRYANT. CABLE ADDRESS: STRYJOURN, NEW YORK

CHICAGO OFFICE.....1570 Old Colony Building
CLEVELAND OFFICE.....1021 Schofield Building
PHILADELPHIA OFFICE.....Real Estate Trust Building
EUROPEAN OFFICE....Hastings House, Norfolk St., Strand, London, Eng.

TERMS OF SUBSCRIPTION

For 52 weekly issues, and daily convention issues published from time to time in New York City or elsewhere: United States, Cuba and Mexico, $3.00 per year; Canada, $4.50 per year; all other countries, $6.00 per year. Single copies, 10 cents. Foreign subscriptions may be sent to our European office.

Requests for changes of address should be made one week in advance, giving *old* as well as new address. Date on wrapper indicates the month at the end of which subscription expires.

NOTICE TO ADVERTISERS

Changes of advertising copy should reach this office ten days in advance of date of issue. New advertisements will be accepted up to Wednesday, 9 a. m., of the week of issue.

Copyright, 1912, by McGRAW PUBLISHING COMPANY
Entered as second-class matter at the post office at New York, N. Y.

Of this issue of the ELECTRIC RAILWAY JOURNAL, 8000 *copies are printed.*

NEW YORK, SATURDAY, MARCH 23, 1912

CONTENTS

Federal Night in Boston 451
Repairing Cars in Service 451
Milestones of Electrification 452
Headlights 452
Condensing Water Problems 453
New Shops and Carhouses of the Boston Elevated Railway in Cambridge, Mass 454
Ozonair Installation on the Central London Railway 458
Through Trip from Boston to New York 459
Papers and Reports at American Railway Engineering Association Convention 460
Electrical Night at the New York Railroad Club 463
Standard Rail Specifications 464
President Taft at New England Club Banquet 465
Meeting of Railway Signal Engineers 466
Chicago Meeting of the Block Signal Committee 466
Meeting of the Illinois Electric Railways Association 467
The American Railway Engineering Association Proceedings 468
Exhibitors at Engineering Convention 471
Psychological Investigation of the Causes of Accidents 473
Electrification of the St. Gotthard Railway 473
Pennsylvania Storage Battery Interurban Line 474
Cooper Hewitt Converter for Railway Service 475
Chuck for Boring Bearings 475
News of Electric Railways 476
Financial and Corporate 478
Traffic and Transportation 481
Personal Mention 483
Construction News 485
Manufactures and Supplies 488

FEDERAL NIGHT IN BOSTON

For the first time in the history of electric railway associations, so far as we recollect, the President of the United States last week addressed an organization of this kind. His remarks at the banquet of the New England Street Railway Club were broadly an expansion of the idea expressed in one of his recent speeches in the following paragraph, which the management of the club had placed on a banner on the wall over the guest table: "I believe in the open door of equal opportunity, under the law, for individual effort and genius." Other speakers at the banquet also indorsed the policy that in a republic the interests of the community are best conserved when the rights of the minority are protected by a constitutional form of government. Coupled with this plan was the idea expressed by Mr. Clements, Interstate Commerce Commissioner, and others, that transportation companies, as well as all other quasi-public corporations, should recognize the necessity at all times of full publicity of their conditions and transactions, so that there may be no oppression or injustice on the side of either the corporation or the public. The approval with which these statements were received indicated that they met the approbation of the members and guests of the club who were present. Indeed, it is difficult to understand how anyone who believes in the advantages of corporate enterprise, whether directly interested in corporations or not, can expect much progress under any other condition of affairs, independent of who may be the standard bearer of these particular policies. Certainly those with money to invest in creative enterprises will not jeopardize their capital if it is to be subject to the temporary whims and vagaries of an electorate which may make one decision on one day and another on the next, without any regard to uniformity in the decisions thus declared. On the other hand, capitalists in transportation enterprises are generally prepared to accept an effective control over their enterprises, provided it is reasonable, just and intelligently administered, and are prepared to assist the authorities by a perfectly frank policy of publicity of their accounts and affairs.

REPAIRING CARS IN SERVICE

One of the subjects which were discussed with some difference of opinion at the last meeting of the Street Railway Association of the State of New York was the extent to which motormen should be encouraged to repair their cars in case of breakdown in service. This is a subject of perennial importance and interest, and it is not possible to reconcile all managers to one course of action because conditions of operation and requirements of service vary so widely on different properties. There is, of course, general agreement that the essential requirement in operation is to keep the line open for traffic. On interurban lines and on roads in small cities where the headways are long a delay resulting from a disabled car is not as fatal to the operation of following cars in a short time as a similar accident on a road located where the headway is very short. As the real question involved is the subordination of other considerations in order that the traffic may be moved without delay, the education of motormen should be directed

with this object in view. The end sought will be attained, not by uniform methods on all lines of all properties, but by a system that leads motormen on remote lines to attempt more than would be desirable in service in large cities. However, a little knowledge may be a dangerous thing, and if trainmen are to be permitted to attempt to repair their cars at all, they should be taught all that is necessary to this end, so that the best service may be given to the public and the equipment not be harmed by improper handling on the road.

MILESTONES OF ELECTRIFICATION

The discussion at the eighth annual electrical night of the New York Railroad Club, as reported elsewhere in this issue, emphasized the significant change which has come about in the viewpoints of both the steam railroad operator and the electrical engineer since the night of Jan. 20, 1905, when W. B. Potter presented to the members of this club his historic paper on "Developments in Electric Traction." Mr. Potter's paper established the first "electrical night" of the New York Railroad Club. At that time electrical engineers felt optimistic enough to electrify almost any railroad in existence, while the steam railroad operators believed that electrification was practicable only for the special conditions of tunnel and heavy terminal service. The conclusive operating data which were presented on March 15 of this year by Messrs. Murray, Katté and Gibbs, on the New Haven, New York Central and Pennsylvania electrifications, respectively, leave no room for doubt that both the single-phase and direct-current systems have amply demonstrated their reliability and even economy for heavy main line as well as terminal electrification. Even more conclusive than the statistics of operation were the statements of Messrs. Murray and Katté with regard to the early extensions contemplated by their companies. Mr. Murray's announcement of economies in overhead construction and of the possible use of a three-wire, 22,000-volt trolley was a most encouraging sign of progress when it is recalled that a 6000-volt trolley was considered radical but eight years ago. It is a happy omen that the discussions of steam railroad electrification have gradually shifted from the sterile "battle of the systems" to the economic aspects of electrification for particular conditions. With such ample data as are now available on the superior reliability and reduced operating costs of electrification, the steam and electrical men have reached the common viewpoint that the problem principally is one of determining whether the savings or increased net earnings would be greater than the additional fixed charges. It has already been pointed out that many roads, such as those entering Chicago, could avoid the investment for power stations by purchasing energy from large central stations. As Mr. Wood suggested at last week's meeting, the initial investment could be still further reduced by the extension of the car trust idea already so familiar to steam railroads. There is little doubt that more than one railroad will find the question of electric operation far less formidable if it can confine its investment to the overhead line and shops and to the improvements in right-of-way conditions, such as the removal of grade crossings, which are the usual accompaniment of an electrified railroad service.

HEADLIGHTS

One of the much mooted questions in electric railroading is the use and abuse of headlights. Powerful lights of the arc variety have from time to time come into use, to be enthusiastically adopted in some places and promptly discarded in others. In city work extremely brilliant headlights have proved themselves so often a nuisance from the standpoint of other traffic as to be forbidden by municipal regulations, and on the other hand in interurban and fast work generally they have proved extremely useful. There is no doubt that there is a tendency to use an excessive brilliancy in the headlights of vehicles of all descriptions. There seems to be no legitimate reason for anyone to object to a powerful headlight on an electric car which runs reliably on its own track while an equally powerful headlight is permitted on an automobile which is liable to dodge all over the road and which confuses drivers and pedestrians alike by its inordinate brilliancy. The service of a headlight is to enable the way ahead to be seen, not to advertise the coming of the car, to scare horses or to terrify wayfarers into jumping fences.

To analyze the question a little further in order that we may get a line upon the real requirements of headlight practice, the one desirable and perhaps necessary thing is that the headlight, whatever its nature, should illuminate the track far enough ahead of the car to disclose obstacles in time to stop without striking them. In other words, recurring to the conception, which we have often set forth in these columns, of every moving vehicle carrying in front of it a dangerous space equal to its braking distance, it is clear that a headlight does all that can be expected of it if it covers the dangerous space so clearly as to enable anything on the track to be picked up in time to stop the car without striking it, making a brief allowance for the time required to see and to act. This holds for automobiles as well as street cars, and considering the promptness with which an automobile can be stopped if necessary it is fairly obvious that a good many of the automobile headlights now in use are abnormally and unnecessarily powerful, provided the driver has the slightest regard for the laws concerning speed. There would be fewer unfortunate accidents to joy-riding parties if the headlights were adapted to a speed of something less than 75 or 80 m.p.h., so that there would be less temptation to drive at breakneck speed and trust to the headlight to disclose trouble in time.

Now, street cars, whatever faults may be alleged against them, are not vehicles selected for joy riding. They run on schedules which are reasonably well preserved, and it is a comparatively easy matter to determine how far ahead the track needs to be lighted at schedule speed in order to enable the motorman comfortably to see an obstacle in time to stop his car. This distance determined, the power of the headlight follows very easily, and anything more than this is unnecessary and may be objectionable from the standpoint of co-occupants of the street. Whenever one applies these data to concrete cases we are inclined to think that the desirability and usefulness of the arc headlight on high-speed interurban service will become self-evident, and likewise it will be reasonably clear that the cases in which its use is justified in purely urban service are very few.

The danger space of a car may easily amount to 300 ft. or 400 ft. on an interurban line where fairly high speeds are attempted, while in ordinary urban service it is hardly a quarter of this. Urban cars also run much of the way through fairly well-lighted territory, so that obstacles on the tracks are seen with comparative ease. It seems quite likely that some of the larger metallic filament lamps may do useful service in cases where a common incandescent headlight is scarcely enough and where an arc seems unjustified. More yet can be done by improvements in the headlight itself to give a beam of more useful dimensions. We are inclined to think that a beam slightly more diffuse than is now used would in many cases be more serviceable, and this means a little added power which the big incandescents already referred to can readily furnish. Enough has been said, however, to show that the headlight is a thing which will bear considerable study and of which the proper characteristics can be determined on a reasonable basis.

CONDENSING WATER PROBLEMS

The development of large turbine plants has of late thrown new burdens upon the power station designer and operator along the line of condensing water service supply. The selection of condensing equipment and the establishment of a continuous flow of circulating or injection water are important problems in reciprocating steam engine installations and have probably received the closest study of experienced engineers. But in the turbine plant of the present day, with its tendency toward the use of high-powered units, the importance of the condensing system can scarcely be exaggerated, since the economy of the turbo-generator is completely wiped out in case it becomes necessary to exhaust into the atmosphere. Again, the huge volumes of condensing water required to secure high vacua with large units demand a source of supply which shall be both reliable and cheap. Only in less degree do these questions press upon the smaller plants for careful solution.

Passing for the present the problems of condenser equipment selection, it is profitable to emphasize the degree to which some designers are subdividing water sources, even where salt water is always available in unlimited quantities. At the recently enlarged Redondo station of the Pacific Light & Power Corporation, which supplies current to all the principal interurban and city lines of Los Angeles, three separate intake pipes have been installed with provision for separate discharge into a triple cleaning basin from which additional independent lines lead through the circulating pumps into the power house. The original engine condenser units of this plant, three in number, are supplied with condensing water by one trunk line, while the additional condensers accompanying two large turbines lately installed are fed independently. The arrangement not only permits the shutting down of any pipe line for cleaning or repairs, but it enables any set of condenser units to be fed from any intake, through the installation of a simple manifold or paralleling header on the ocean side of the circulating pumps. The subdivision of the screen basin and provision of air taps in the several intakes, supplemented by the installation of a sand pump at the bottom of the former and the arrangement of multiple screens and facilities for washing debris from the latter, illustrate the care which is now being taken in a representative case to insure clean water service, the absence of which means so much injury to the economic performance of a plant. The first cost of such a subdivision is doubtless a good deal greater than the expense of putting down a single intake line, but when it is reflected that 50 per cent of the work which a turbo-unit performs is handled in expansion below atmospheric pressure compared with 25 per cent in the reciprocating engine, the vital importance of continuous operation condensing is apparent. It is evident not only from the experience of the Redondo plant but from that of other stations that more care will have to be given in the future to the design of screen chambers, methods of freeing intakes from debris and clogging, the arrangement of intake piping and the control of pump operation. Where the grade of the station permits a gravity flow of sea or pond water into the cold well through a single conduit of ample size, multiple screening is still desirable, although the piping arrangements may then be somewhat simplified, as in the new station under construction at Long Beach by the Southern California Edison Company.

Whether jet or surface condensers are employed, too much care cannot easily be bestowed upon the accurate control of the water supply and upon the measurement of its temperature at intake and discharge, and where city water is used in connection with a cooling tower or pond, records of the flow required under various load conditions are most valuable. The renewed interest in the use of electrically driven auxiliaries for condensing plants which has been apparent during recent years offers another opportunity for obtaining valuable records of operating conditions. The power used by electric motors can easily be recorded and there is no logical reason why readings on motor-driven auxiliaries should not be made a part of station records.

It is taking plant owners quite a long time to find out that money spent on proved measuring apparatus on the steam side of the station is pretty cheap insurance against undetected waste. There is room on many station logs for data concerning the speed of pumps, injection flow and temperatures as yet seldom determined except under test conditions. The value of heat units is only partially appreciated in many cases, but the time is coming when there will be a subdivision in the methods of driving circulating pumps, to cite a single example. There is food for thought also in such an installation as that of the El Paso Electric Railway Company, where each of the turbine circulating pumps in a station extension is equipped for direct driving by a motor and by a small steam turbine, these being used alternately as the demand for exhaust steam at the feed water heater decreases or grows greater.

Reliability and economy of operation seem to be setting aside at least the elementary simplicity of former condensing water services, but the complications of subdivision along symmetrical lines are more fancied than real, and as the value of flexibility becomes better appreciated there is no doubt that many new and interesting installations will be made.

New Shops and Carhouses of the Boston Elevated Railway in Cambridge, Mass.

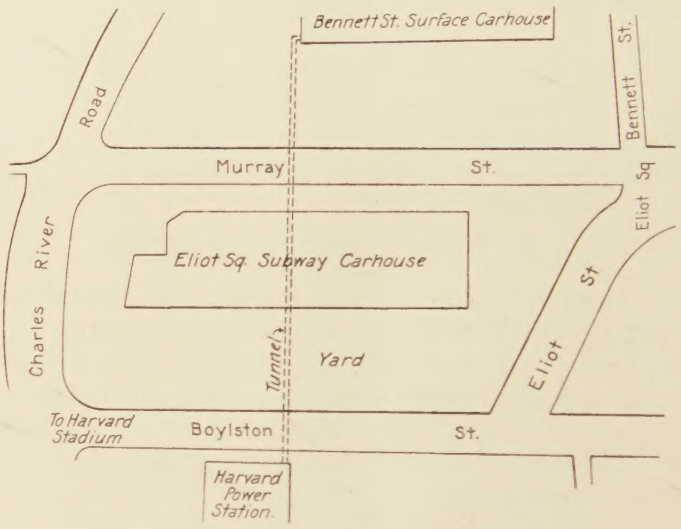
The Property Consists of a Storage Carhouse, Shop and Yard for Subway Car Equipment and an Operating Carhouse for Surface Cars—The Two Structures Are Connected by a Concrete Tunnel 660 ft. Long

In anticipation of the opening of the new Cambridge subway the Boston Elevated Railway has completed a large storage carhouse, shop and yard for the subway car equipment and a modern operating carhouse for surface cars on a tract of 11 acres in Cambridge fronting on the Charles River and adjoining the Harvard power station of the railway company. The new shops and carhouses are located about two blocks west of the Harvard Square transfer station, which will be the western terminal of the subway trains and the southern terminal of several surface car lines running to the north and west. The convenient location of these carhouse and shop facilities with reference to the Harvard Square terminal will reduce the non-revenue mileage to the minimum and will insure efficient operation in other respects. Provision has been made for inspection and light maintenance work at both the subway and surface carhouses. In connection with the subway storage yard a passenger loading and unloading platform has been built along one side to handle the large crowds which will be carried to and from the Harvard Stadium at the time of football and baseball games.

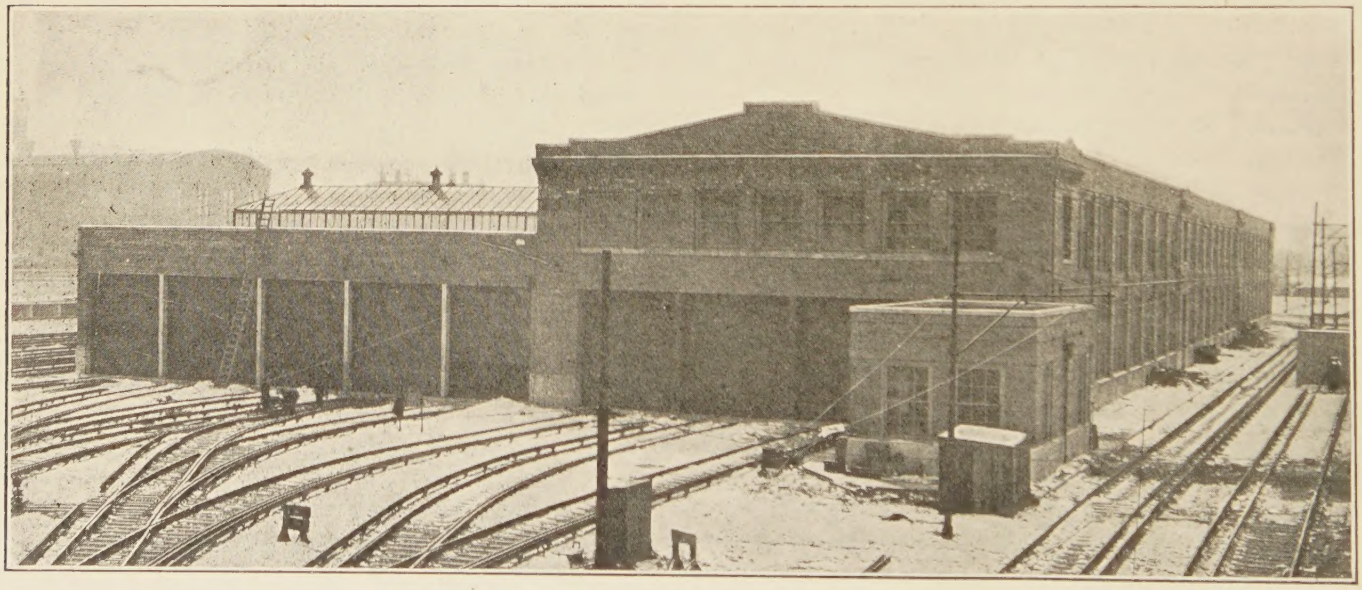
GENERAL LAYOUT

The subway and surface carhouses are located on opposite sides of Murray Street, Cambridge, between Eliot Square and Charles River Road. They are connected with each other and with the company's Harvard power station by a concrete tunnel 6 ft. high by 5 ft. wide. The tunnel is about 600 ft. long, and both carhouses are supplied with steam, hot and cold water and electricity for power and lighting service by pipe lines and wiring run in this tunnel from the power house. No steam-generating equipment is installed in either carhouse. The two buildings have an unusually favorable location with respect to light and air by reason of the frontage of the property on the Charles River, which insures a permanent easement on the west side. Each building is provided with several large skylights in the roof so that the working areas about the tracks and pits are well illuminated from above throughout the entire day. Although the surface car and subway facilities are separated by a street, they are connected by surface tracks, which permit of free movement of service cars in connection with the shipment of trucks, motors and other equipment and supplies to and from these shops and the other repair shops of the company.

The subway carhouse with the adjoining storage yard is located at the head of an incline leading directly into the Cambridge subway and thence to the Harvard Square terminal and transfer station. The carhouse is about 500 ft. long by 140 ft. wide over all. On the south side is a storage yard about 150 ft. wide and the full length of the carhouse. The yard and carhouse floor are about 10 ft. below the street level and the entire depression is surrounded by a reinforced-concrete retaining wall. A loop track surrounds the yard and carhouse.



Cambridge Carhouse—Map of Property



Cambridge Carhouse—Exterior of Subway Carhouse

On the south side of the yard adjoining the loop track is situated a reinforced-concrete loading and unloading platform 350 ft. long by 18 ft. wide for handling football crowds. This loop track and loading platform will per-

mit the multiple-unit subway trains to run around the carhouse and discharge or load as many as 1000 passengers per train at a point within ¼ mile of the Harvard Stadium, which is reached by a bridge over the Charles River.

FOUNDATIONS AND DRAINAGE

The entire yard and carhouse are built on a foundation of piles which was necessary because of the swampy subsoil. On top of these piles was laid a bed of reinforced concrete about 16 in. thick. The carhouse and yard are drained by gravity into a sump located just inside the subway incline. Above this sump are installed two Lawrence 4-in. centrifugal pumps, each direct-connected to a 5-hp, 550-volt direct-current motor. The pump motors are equipped with Cutler-Hammer automatic motor starters operated by float connections in the sump. The pumps deliver the drainage water into a discharge pipe running to the river. The pump well is 20 ft. x 10 ft. x 9 ft. in dimensions. Emergency outlets and hose connections are provided for priming either or both of the pumps in case the vacuum is lost.

Cambridge Carhouse—Interior of Subway Car Shop

SUBWAY CARHOUSE

The subway carhouse is a brick structure with concrete foundations, steel columns and a concrete slab roof carried on steel trusses and fitted with wired-glass skylights. The main building is divided into a machine shop, an inspection shed and a paint shop. A stockroom and an oil house are located at the rear with an intervening fire wall to protect them from the rest of the structure. The machine shop is 435 ft. long and 65 ft. wide, and is served by a 23-ton Niles electric traveling crane, which travels the entire length of the shop. Three parallel tracks 15 ft. apart on centers are carried the entire length of the machine shop. One track is provided with an inside rail to permit handling armatures and other heavy parts on a narrow-gage hand truck. The machine shop tracks are extended beyond the building at the rear end so that quick transfer of equipment and material can be made to or from either surface or subway cars on the loop. A spur track connecting with the loop track enters the yard by an incline from Murray Street and connects the subway yard tracks with the surface tracks on the street level. The front end of the machine shop is closed with three 15-ft. span Kinnear rolling-lift doors.

The machine shop pits, which extend 80 ft. in from the east end, are of reinforced concrete, about 4 ft. 3 in. deep from the top of the rail. As shown in the accompanying cross-section, the pits are 4 ft. 8½ in. wide, and the walls are reinforced with ⅝-in. square steel rods set from 8 in. to 12 in. apart on centers. The walls of the pits are 18 in. thick and are chamfered to a depth of 4 in. at the top to give additional working space. The track is composed of 85-lb. T-rails bolted to reversed Carnegie M-24 steel ties spaced 3 ft. apart on centers, the ties being 3 ft. long and 3½ in. deep. The ties are surrounded by concrete, which is carried up to the top of the rail to bring the floor flush with the rail. The pits drain toward the entrance of the building.

A drawing of the track construction in the flush floor section of the machine shop is reproduced. The rails are carried on Carnegie steel ties and are concreted in and bolted. The surface of the floor is cut away from the head of the rail for a depth of 1⅜ in. on the inside of the rail to permit free movement of the wheel flange. The rail and its surrounding concrete are separated from the rest of the flooring by a joint in the concrete.

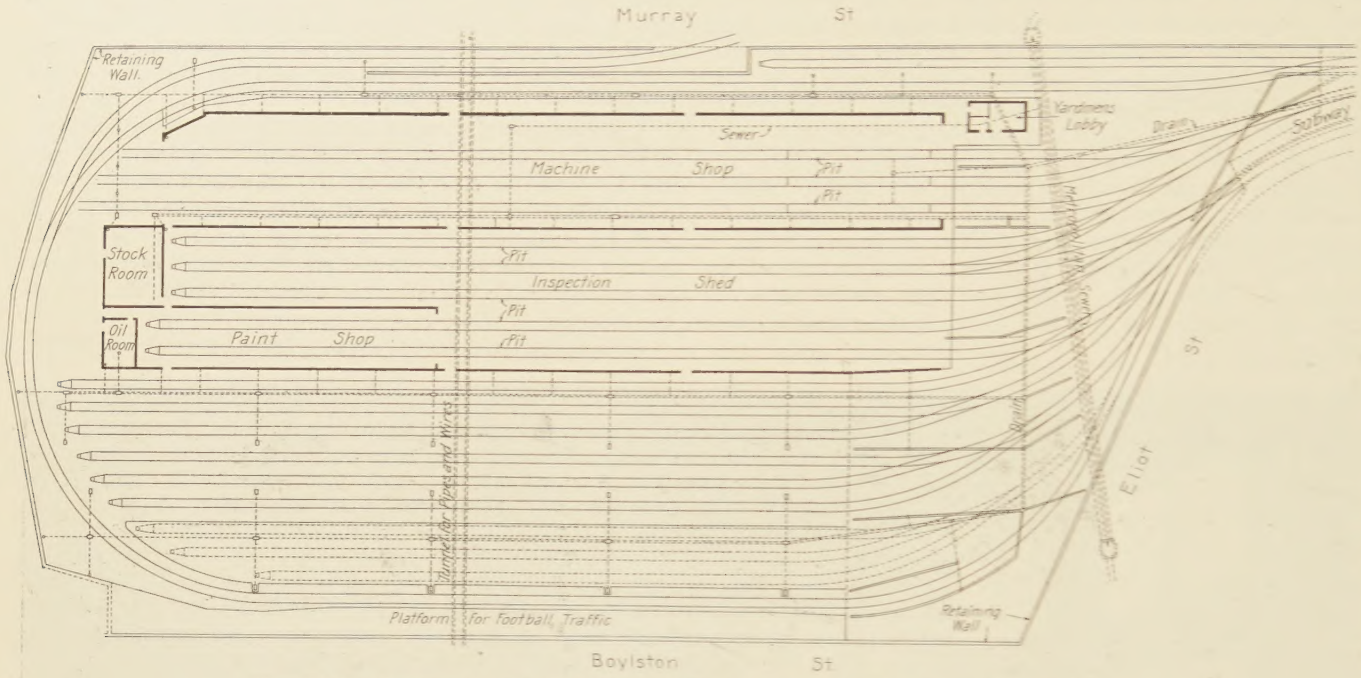
At present the machine shop is being utilized for assembling the forty new steel cars for the Cambridge subway service. The shop is temporarily lighted by about forty mercury vapor lamps hung from the roof trusses and a temporary installation of machine tools belt-driven from a 550-volt direct-current motor is in service. Compressed air is supplied from the plant of the building contractor. The temporary tools include a lathe, grinder, drill press, pipe bender and various pneumatic tools employed in fitting up the cars. A temporary storeroom has also been fitted up. No current for car propulsion is carried into the machine shop, the present plan being to move cars with the overhead crane. If necessary, a traveling "bug" or contact roller with a flexible cable will be installed later, but the practicability of using the crane for haulage as well as lifting will be tested first. At various points in the floor concrete foundations have been installed for supporting horses capable of carrying car bodies when trucks are removed.

When completed the shops will be provided with two down-draft forges and a few motor-driven, direct-connected tools probably will be added. It is planned to handle all heavy motor and truck repairs at the main shops of the elevated division at Sullivan Square, Charlestown, and to transport these parts by service cars. The track storage capacity of the machine shop is about fifteen 70-ft. cars.

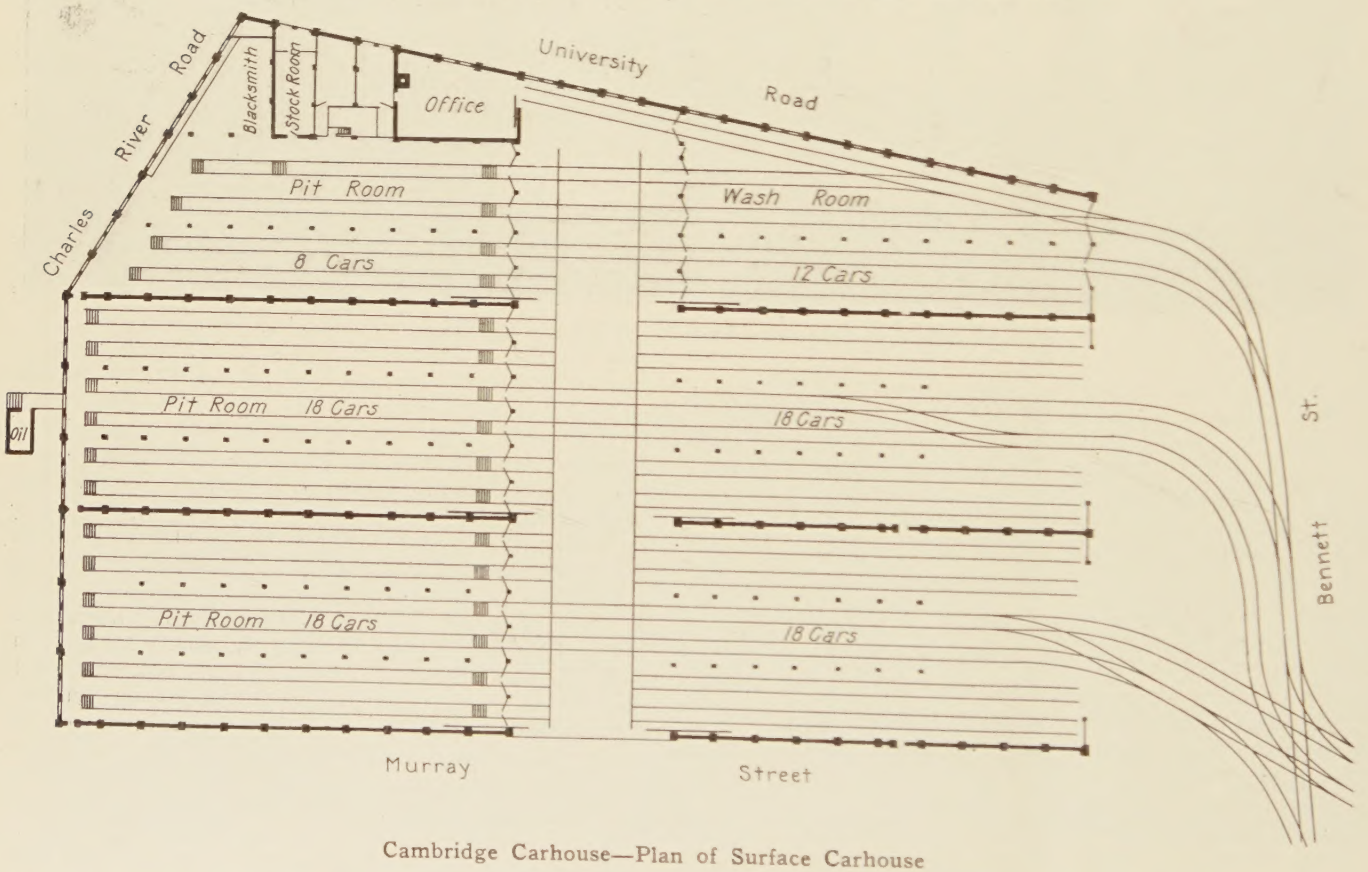
INSPECTION SHED

The inspection shed covers five tracks, spaced 15 ft. apart center to center. It is 80 ft. wide and parallels the machine shop, being separated from it by a fire wall. All the inspection tracks are provided with pits for their entire length. The rear end of the inspection shed is utilized as a paint shop, a fireproof section 170 ft. long by 35 ft. wide in plan having been set off from the rest of the shed for this purpose. Beyond the paint shop is a 17-ft. x 26-ft. oil room with concrete floor, screen drainage and parapet roof. The floor of the oil room is laid about 4 in. below the level of the doorsill to prevent oil flowing out in case of leakage or fire. At the end of the inspection pits is a stockroom 43 ft. x 32 ft. A 5-ft. passageway separates it from the oil room and provides convenient access to the latter. All tracks in the paint shop and inspection shed terminate with Ellis bumper posts. The capacity of the inspection shed and paint shop is thirty cars.

In the inspection shed the tracks consist of 85-lb. T-rails screw-spiked on 10-in. x 6¼-in. x 12-in. hard-pine blocks. These blocks are carried in chairs formed by Z-bars bolted to a supporting web, as shown in the accompanying drawing. The supporting blocks are spaced 2 ft. 6 in. apart on centers and can be replaced readily. They are fastened to the chairs by two ¾-in. bolts spaced 7 in. apart on centers. The rail head is raised to a height of 12 in. above the floor



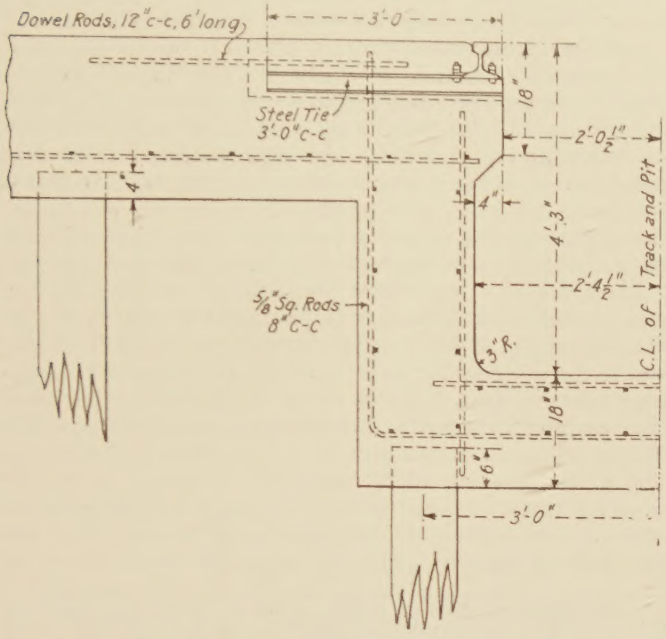
Cambridge Carhouse—Plan of Subway Carhouse, Shop and Storage Yard



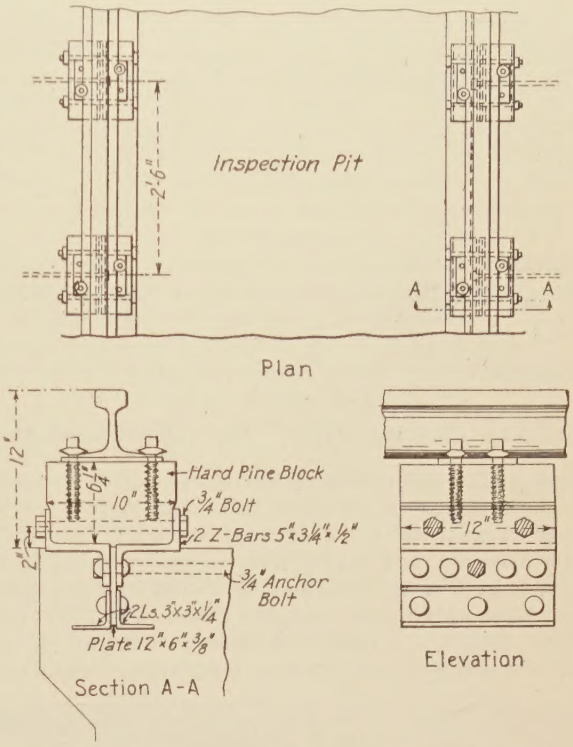
Cambridge Carhouse—Plan of Surface Carhouse

level. The supporting web with its bottom flange angles is surrounded by the concrete floor. A similar method of supporting the rails is employed in the track construction in the storage yard. All screw spikes were driven by compressed-air motors and the holes in the blocks were also bored by this method, which has been followed on practically all the trackwork in the subway. By the use of air motors the rails have been laid and fastened more rapidly than would have been possible with ordinary hand-driven spikes.

The storage yard at present contains six tracks spaced



Cambridge Carhouse—Section of Machine Shop Pits



Cambridge Carhouse—Track Support in Inspection Pits

12 ft. apart on centers. Space has been left for three additional tracks on the east side. The tracks in the upper end of the yard near the subway entrance are built with rock ballast. All storage tracks are provided with third-rails at the side, the third-rail insulators being supported on extra long ties. Foundations for columns have been installed in the yard to permit its being entirely roofed over in the future if desired.

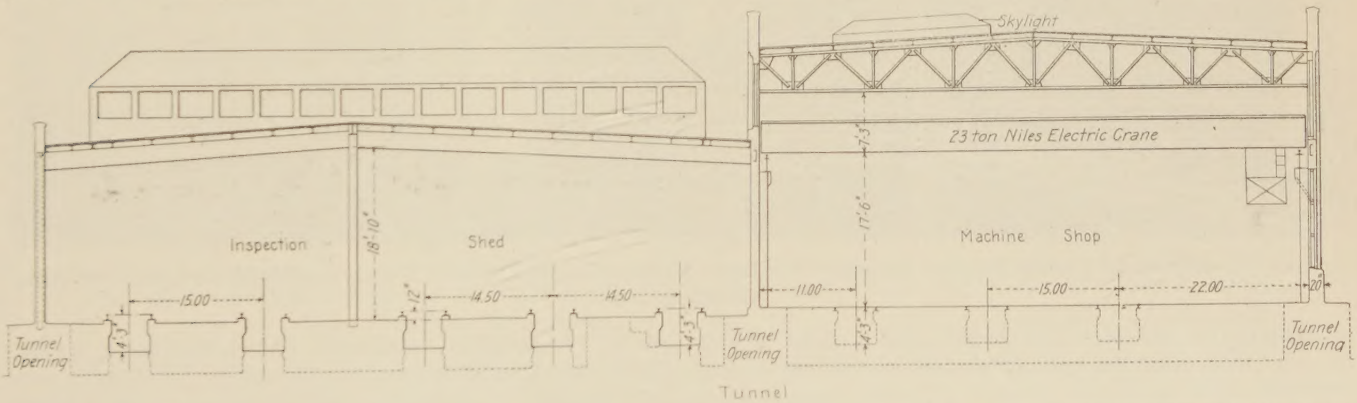
PIPE TUNNEL

The pipe tunnel, leading from the Harvard power station, is of rectangular cross-section, and the walls are reinforced by ⅝-in. square rods throughout. It is sloped to drain into a sump at the Harvard power station and a waterproof lining is carried completely around the tunnel. Conduits for lighting and shop power cables are installed at the side, and all pipes are hung by metal bands attached to rings which are looped around brackets bolted to angle irons in the side walls, thus permitting free expansion and contraction. The pipe supports are installed 10 ft. apart and the pipes are run in 21-ft. lengths in the tunnel. Manholes with reinforced-concrete slab covers are installed in the pits at various points above the tunnel for convenient access to the tunnel. Steam heating is employed in all pits. Four parallel coils are installed on each pit wall and the return condensation is carried back to the power house through the tunnel.

THIRD-RAIL SECTIONALIZATION

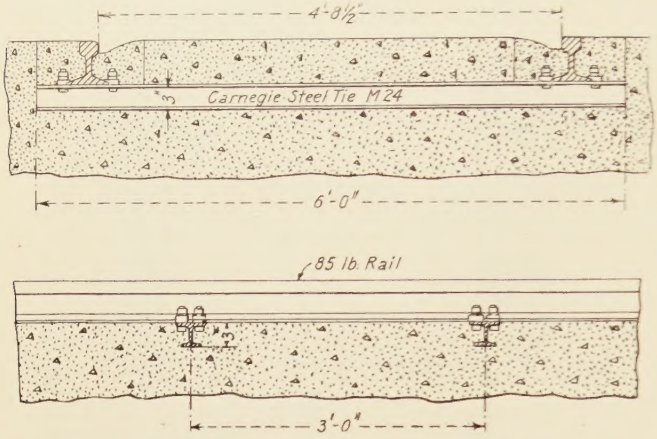
The supply of current to the third-rails in the yard and at the head of the subway incline is by a line of cables carried along the south retaining wall of the yard after leaving the power station. Near the beginning of the incline are installed two main distribution boxes provided with sectionalizing switches controlling the feeders to the various third-rail sections. From the switch boxes short underground leads run to secondary switch boxes located at various points around the yard for controlling small sections of third-rail. All feeder switches installed in the yard boxes are of the knife type with extension handles 18 in. long linked by short iron straps to the usual switch handles, so that they can be handled with greater safety when current is on.

In the ordinary operation of the subway shops train



Cambridge Carhouse—Cross-Section Through Inspection Shed and Shop

movements will not be required from the subway into the yard except for the purpose of inspection or repairs, or when the train is to be laid up. The subway tracks are equipped with cross-overs near the head of the incline under Eliot Square. These cross-overs are controlled from an interlocking tower and terminal switching will be done over them independent of the shop and yard operation. The storage capacity of the open loop track in the yard is twenty-one cars, and that of the storage yard tracks will ultimately be fifty-six cars, making a total storage capacity of 122 70-ft. cars in the yard and shops. For the convenience of trainmen a brick and concrete building 32 ft. x 16 ft. and one story high, with a lamp room, lavatory and lounging room, has been built in the yard in front of the machine shop, near the head of the incline leading to the subway.



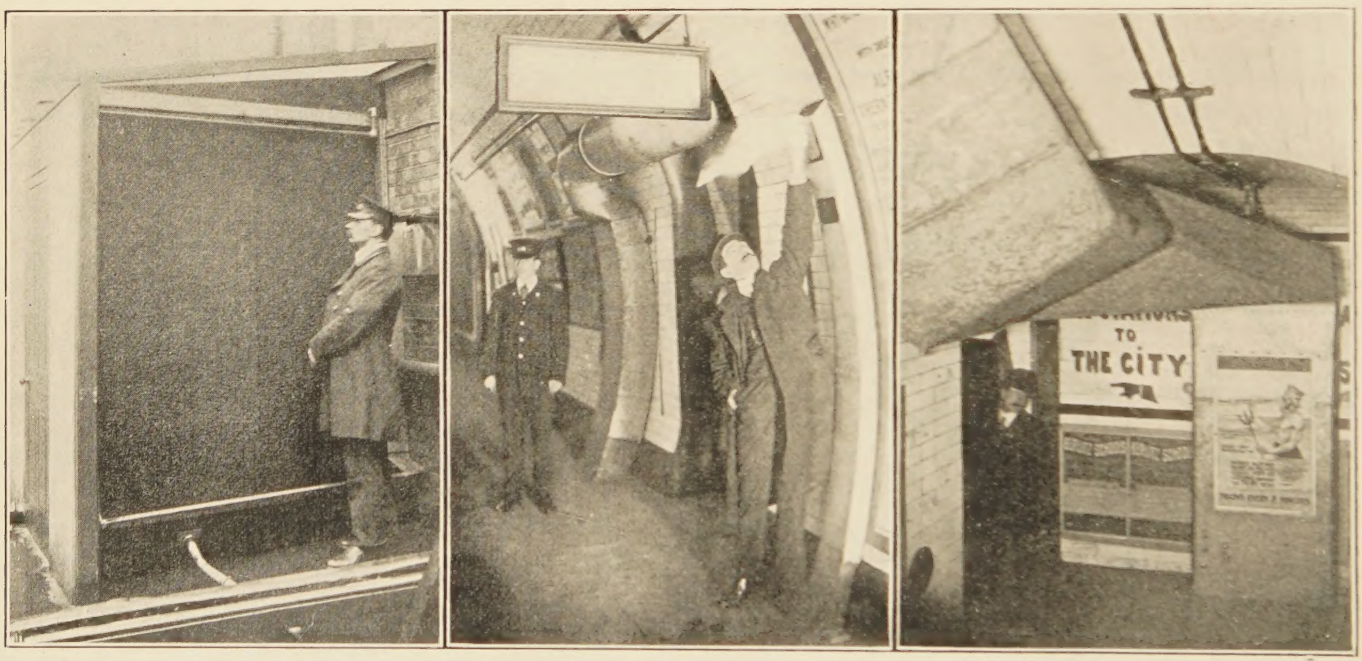
Cambridge Carhouse—Flush Floor Track Construction

SURFACE CARHOUSE

The Bennett Street surface carhouse is a brick and steel structure with a tar and gravel roof carried on wooden trusses. It is used entirely by surface cars and contains three pit rooms separated by fire walls, a transfer table, two storage and shifting rooms with brick walls between, and a washroom. A blacksmith shop, locker room and stockroom are also provided. Sixteen parallel tracks are carried through the building. The pits are located at the rear in order to interfere as little as possible with the regular movement of cars. Liberal monitor skylights are provided in the roof. Concrete was extensively used in the foundation and pit floor construction of this building. The capacity of the house, which covers an area 375 ft. x 270 ft., is about ninety-two cars of the company's semi-convertible type.

OZONAIR INSTALLATION ON THE CENTRAL LONDON RAILWAY

The Central London Railway is an underground line which runs from Wood Lane on the west side to the Bank of England, a distance of nearly 7 miles, in two tunnels which have an aggregate length of about 13 miles. These tunnels are tubes of 11 ft. 8 in. in diameter built at a depth of 60 ft. to 100 ft. They are interconnected at several points by crossovers which are convenient from a traffic standpoint but which add greatly to the difficulty of ventilation. During the eleven years which have elapsed since their opening these tunnels have been ventilated on the exhaust system, the method consisting in closing all the doors underground for a certain period after the running of the last train and drawing air through the tubes from one end to the other by means of a 200-hp exhaust fan at Shepherd's Bush. This thorough cleaning every night has been supplemented by a continuously running exhaust fan at the British Museum station and by the natural ventilating action of the running trains. In view, however, of the increasing traffic, it was decided to adopt a more positive system of ventilation to provide during the whole of the day a large quantity of fresh air treated with ozone to purify and improve its quality. This installation, as designed and constructed by Ozonair, Ltd., London, in conjunction with E. P. Grove, chief engineer of the Central London Railway, has now been completed as hereinafter described.



Ozonair Installation of Central London Railway—Air Filter Screen, Platform Outlet for Ozonated Air and View of Air-Carrying Duct

The ozonating apparatus is a practical application of Van Marum's discovery in 1785, that oxygen gas through which an electric spark had been passed possessed a peculiar smell. Chemically, ozone is an allotropic form of oxygen. The molecular structure of these two gases is expressed respectively by the symbols O_3 and O_2.

In ozonating the air for the Central London Railway, the first step is to draw the main air supply from the cleanest

source possible and to pass it through filtering screens which absorb the sulphuric acid and such other deleterious gases as are found in the atmosphere of all large cities. The incoming air is drawn through the screen by the aid of a motor-driven fan which is kept moistened by flowing water. The cleaned air then is passed into a mixing chamber where it is purified and partially sterilized by means of ozone. It is also enriched by the addition of a minute quantity of pure ozone, thereby giving it the bracing effect of sea or mountain air. The air from the mixing chamber is distributed by means of ducts or conduits to the various parts of the installation. Included in the system is the provision at will of a heating or cooling coil, to be placed in the mixing chamber or other convenient position. The number of changes of air are calculated according to the special requirements. Drafts are avoided and the amount of air, and also the strength of the added ozone, can be adjusted in accordance with the temperature and barometric conditions.

The plant required to operate this system is so simple that in many installations made the entire control is left in the hands of quite an inexperienced person. In fact, the whole operation is quite automatic as it depends principally upon the manipulation of two or three ordinary electric switches. After the motors have been started they may be left unattended for days. The space taken up by the apparatus is comparatively small, while the cost of energy and maintenance is said to be very low.

OZONATING INSTALLATIONS

The Central London equipment consists of an independent plant at twelve of the thirteen stations. The exception is Shepherd's Bush, which is near the open end of the tunnel. Every ozone generator consists of a series of ten generating units, each comprising a thin mica plate with a sheet of metallic gauze on either side, the set of ten plates being spaced and mounted on insulating supports. The gauze sheets are connected across the secondary of a small transformer which delivers alternating current at a pressure of 5000 volts. The ozone is formed by the countless number of minute discharges which occur all over the opposing surfaces of the plates. The comparatively strong mixture produced in this generator is conveyed by an ozone pipe to the mixing chamber of the main ventilating fan, where it is mixed with the main current of air and thence blown through the main air trunk to the distributing ducts.

The main ventilating fans are of the "Sirocco" type, which are usually driven by 7½-hp motors. The ozone generator is supplied with 5000 volts a.c. by means of a transformer connected to a 380-volt a.c. 550-volt d.c. rotary converter. The 7½-hp motors deliver from 5500 cu. ft. to 6500 cu. ft. of air per minute. The Holland Park and British Museum equipments deliver 18,000 cu. ft. and 10,000 cu. ft. per minute respectively. In all, over 80,000,000 cu. ft. of ozonized air are pumped into the tunnels every working day.

The main ducts are generally 3 sq. ft. in cross section. All are constructed of galvanized mild steel, but the shape of the section differs according to space available at each place. In each station a small proportion of the treated air is supplied to the ticket offices, lavatories, etc., above, while the greater part is carried down the main duct to a distributing duct under each platform from which five or six vertical ducts expel the air into the station at a height of about 7 ft. above the platform. Air is delivered into the tunnels via two larger branches from the main duct which are carried for some 40 ft., one along each of the two tunnels in the direction in which the trains run. The action of the trains is to draw this treated air through the tunnel as far as the next station. Thus, the thorough permeation of the ozonized air to every part of the tunnel is insured. About one-third of the air carried down is distributed along the platforms, while the rest is delivered into the tunnels.

THROUGH TRIP FROM BOSTON TO NEW YORK

A party of railway officials who attended the banquet of the New England Street Railway Club in Boston on the evening of March 19 made a trip from that city to New York by trolley car on March 20 and 21.

The starting point was Park Square, Boston. Leaving at 8 a.m. on March 20 in the private car Huguenot of the Worcester Consolidated Street Railway Company, the party went directly to Worcester, following the line of the Boston & Worcester Street Railway. The time of arrival at Worcester was 10 a. m. and the party was met by F. H. Dewey, president of the Worcester Consolidated Street Railway. A stop of three-quarters of an hour afforded an opportunity for an automobile trip to a number of points of interest. From Worcester to Springfield the route was over the lines of the Worcester Consolidated road to East Brimfield and then over the Springfield Street Railway to Springfield. Lunch was served on the car.

The time of leaving Worcester was 10:45 a. m. and the party arrived at Springfield at 2:15 p. m. E. J. Dickson, manager of the Springfield Street Railway, was in the party and other officials of that company met the car, and an automobile tour in the city was made in the short time that was spent there. The car left Springfield at 2:52 p. m. and went south, following the line of the Springfield Street Railway to the Connecticut-Massachusetts State line south of Longmeadow, the Hartford & Springfield Street Railway from that point to East Windsor Hill and the Connecticut Company to Hartford, which was reached at 4:45 p. m.

A stop of only a few minutes was made in Hartford and the car left that city at 4:52 p. m., passing through New Britain and other points and reaching New Haven at 8 p. m. The party had dinner and spent the night at the Taft Hotel at New Haven and left at 8:35 o'clock on the morning of March 21 in a private car of the Connecticut Company.

The route was over the line of the Connecticut Company to the Mianus River at Cos Cob. Lunch was served on the car. One break in the track between Boston and New York occurred at the Noroton River bridge at Darien, Conn. Temporary tracks were laid across this bridge to permit the car to pass. Rails were laid on their side over the bridge and by the expedient of having one man hold a wire on the trolley pole and another a wire on the truck of the car, power was secured to enable the car to pass across the bridge from the laid track on one side to the completed track on the other side. This bridge is to be widened and permanent tracks are to be laid thereon.

From the Mianus River the route was via the New York & Stamford Railway to Larchmont. From there the lines of the Westchester Electric Railroad and Union Railway were used to 128th Street and Third Avenue, New York.

Among those who were in the party for all or part of the trip were: Thomas N. McCarter, president of the Public Service Corporation of New Jersey; E. C. Foster, president Manchester (N. H.) Traction, Light & Power Company; C. S. Sergeant, vice-president Boston Elevated Railway; Matthew C. Brush, second vice-president Boston Elevated Railway; L. S. Storrs, vice-president Connecticut Company; H. C. Donecker, secretary and treasurer American Electric Railway Association; E. P. Shaw, Jr., general superintendent Boston & Worcester Street Railway; C. S. Clark, Pennsylvania Steel Company; Robert S. Goff, vice-president and general manager Bay State Street Railway; J. K. Punderford, general manager Connecticut Company; W. A. Rice, New Haven; Henry C. Page, general manager Worcester Consolidated Street Railway; C. V. Wood, traffic manager Springfield Street Railway; E. J. Dickson, manager Springfield Street Railway; H. S. Newton, general manager Hartford & Springfield Street Railway; F. H. Dewey, president Worcester Consolidated Street Railway; W. A. Trubee, Galena Signal Oil Company, Bridgeport, Conn.; M. J. Leary, passenger agent Connecticut Company.

Papers and Reports at American Railway Engineering Association Convention

Many Subjects Considered at the Meeting in Chicago This Week—Among the More Important Topics on the Program Were Rules for Employees of the Maintenance of Way Department, Ties, Third-Rail Clearances, Crossings of Transmission Lines, Wood Preservation and Storage Battery Traction

The American Railway Engineering Association held its thirteenth annual convention in Chicago on March 19, 20 and 21. As has been the custom, the National Railway Appliances Association held its annual exhibition of railway appliances and supplies at the Coliseum during the same week.

The week's proceedings of the Engineering Association included reports of progress and conclusions drawn by the various committees which were appointed at the last annual meeting. All reports were complete and described in detail the work each committee has done during the past year. A number of subjects were presented which are of particular interest to electric railways, the abstracts of which are given below. A report of the discussion on some subjects is presented elsewhere in this issue.

RULES AND ORGANIZATION

The committee on rules and organization recommended that the following rules for government of employees of the maintenance of way department be added to those already adopted:

"Instructions.

"Cross-Sections.

"(1) The roadbed, ballast and track shall conform to the standard plans. No changes in the sections shown shall be made without proper authority. (Note: It is understood that cross-sections for wet cuts will be included in the standard plans.)

"Drainage.

"(2) All ditches, including intercepting ditches on the upper side of cuts, must be kept clean.

"(3) Where heaving or wet spots develop, special drainage shall be provided.

"Ballasting.

"(4) Before re-ballasting track, line and grade stakes shall be set by the engineer. All unsuitable material shall be removed and the roadbed widened to proper section, the waste material being used to widen banks, or otherwise, as may be directed.

"(5) Track must be kept in good line and surface while ballasting, open track avoided as far as practicable, and such track carefully watched.

"(6) After ballast is distributed it shall be trimmed, and the track lined and surfaced to conform to the standard plans.

"(7) Where track is bonded, ballast must be kept at least 1 in. below the base of rail. At road crossings, platforms, etc., where this is not practicable, only clean gravel or rock ballast shall be used.

"Ties.

"(8) Ties stored along right-of-way shall be piled to conform to the standard plan. (Note: The standard plan should show the minimum distance to the nearest rail.)

"(9) The ties in track must be inspected at stated times each year and those which will not last until the next inspection marked for renewal.

"(10) The renewal of ties shall be started when directed by the ..... (title). When ties are being renewed, the line and surface shall be corrected and ballast trimmed.

"(11) All defective ties removed from track shall each day be placed for burning or loading on cars.

"(12) The ..... (title) shall frequently inspect ties removed from track to see if any have been removed which might have remained in the track with safety until the next inspection.

"(13) Ties shall be spaced according to the standard plans. All ties shall be placed square to the line of rails. The outside ends on double tracks and the ends on one side throughout on single track must be lined parallel with the rail.

"(14) The heart side of ties must be turned down. The largest and best ties shall be selected for use at joints. Twisted or badly hewn ties must not be notched, but the bearings must be made true with the adze.

"(15) Whenever spikes are drawn from ties, wooden tie plugs must be driven into all holes except in ties which are to be renewed that season. In replacing spikes they should be driven into the plugs.

"Rail.

"(16) In unloading rails from cars they should be skidded or otherwise carefully lowered to avoid injury. Where it is necessary to drop them, both ends must be dropped together and the greatest care taken to avoid their falling on hard and uneven surfaces.

"(17) The bottom of the new rail and the bearing surface of the tie shall be cleaned before the new rail is laid.

"(18) When replacing rail with rail of the same section, only two rows of spikes shall be drawn; in replacing with rail of a different section, three rows of spikes shall be drawn.

"(19) In laying new rail, standard expansion shims shall be used. The temperature of the rail shall be taken by placing the thermometer on the rail. The openings between 33-ft. rails shall be as follows:

Temperature (Fahr.)	Amount of Opening.
0 deg. to 25 deg.	¼ in.
25 deg. to 50 deg.	3/16 in.
50 deg. to 75 deg.	⅛ in.
75 deg. to 100 deg.	1/16 in.
Over 100 deg. to be laid close.	

"The rail should be laid without bumping and, when practicable, laid rail by rail.

"(20) The rails shall be brought squarely into line and at least two bolts tightened before spiking. All joint bars shall be securely fastened with the full number of bolts, tightening those at the center first. At permanent connections of rails of different sections step chairs and off-set splices must be used.

"(21) All spikes must be driven vertically with the face in contact with the base of the rail. They should not be straightened while being driven. The rail must be full spiked and the spikes staggered so that the outside spikes shall be on the same side of the tie and the inside spikes on the opposite side.

"(22) In making temporary connections in main tracks an old rail should be cut and fastened to the new rail, using compromise joints when necessary. Switch points shall be used for this purpose only during the presence of the track foreman.

"(23) After new rail is laid the track must be lined and surfaced.

"(24) All kinked or crooked rails must be straightened before being laid; if bent in service they must either be removed or straightened.

"(25) Rails for curves of 2 deg. and over should be curved before being laid. In curving or straightening rails, the rail bender must be used.

"Surfacing.

"(26) When surfacing (picking up low joints or other low places) the general level of the track must not be disturbed."

SIGNALS AND INTERLOCKING

The committee on signals and interlocking submitted a revised specification for various kinds of insulated wire, which was accompanied by a new insulation resistance table. This committee also submitted a revised set of signal aspects.

IRON AND STEEL STRUCTURES

The committee on iron and steel structures recommended for adoption a set of specifications for the erection of railroad bridges.

BALLAST

The committee on ballast drew conclusions from exhaustive tests on the proper depth of ballast which were as follows:

"With the ties (7 in. x 9 in. x 8½ ft.) spaced approximately 24 in. to 25.5 in., center to center, a depth of 24 in. of stone ballast is necessary to produce uniform pressure on the subgrade, and a combination of a lower layer of cinder ballast (18 in. to 14 in.) and an upper layer of stone ballast (6 in. to 10 in.), approximately 24 in. deep in the aggregate, with the same spacing of the ties will produce nearly the same results."

This committee's report on physical tests of stone for ballast included a review of gravel ballast, recommended methods for grading the different qualities and gave a description of a gravel washing plant.

TIES

The report of the committee on ties included a discussion of the investigation to determine the size of cross ties required for the stresses to which they are subjected. The committee concluded that it was not feasible to lay down a fixed rule for the size and spacing of ties, based on a density of traffic classification, and presented reasons for this conclusion. The tie committee also thoroughly investigated the question of tie renewals in continuous stretches versus single tie renewals and recommended the practice of single tie renewals. The investigation of metal, composite and concrete ties was reported and the committee submitted the following conclusions:

"(1) The concrete tie, a combination of concrete and metal tie, or a combination of asphalt and metal tie has not yet proved a success for the following reasons: (a) fracture caused by vibration; (b) excessive weight and consequent difficulty in handling; (c) deterioration of asphalt filling.

"(2) A combination tie of steel and wood gives promise of developing an economic substitute.

"(3) The all-steel tie has proved a satisfactory substitute for the wood tie under heavy medium speed traffic. It is durable, line and surface can be maintained, has sufficient resiliency and can be insulated. The fastenings so far in use can and no doubt will be improved."

TRACK

The committee on track submitted revised plans of Nos. 8, 11 and 16 rigid frogs and No. 11 spring frog and also submitted a revised and combined general specification for frogs, crossings and switches.

CONSERVATION OF NATURAL RESOURCES

The committee on conservation of natural resources reported progress along the line of special observation of those particular features in which railways were directly and practically interested. The report contained additional information on the same subjects reported at the last annual meeting, which included the study of tree-planting and general reforestation, coal and fuel oil resources and iron and steel resources.

MASONRY

The report on the subject of masonry recommended no changes in the manual, but contained abstracts from replies to questions asked of a number of railway engineers on the methods of waterproofing masonry, methods of patching and repairing plain and reinforced concrete and methods of depositing concrete under water. The conclusions drawn on the latter subject were as follows:

"(1) Concrete may be deposited successfully under water, if so handled as to prevent the washing of the cement from the mixture.

"(2) Cofferdams should be sufficiently tight to prevent current through the pit, and the water in the pit should be quiet.

"(3) The concrete should be deposited in place either by means of a drop-bottom bucket or a tremie and should not be allowed to fall through the water.

"(4) Where a bucket is used, it should be carefully lowered to the bottom and raised to the surface, so as to cause as little disturbance as possible of the water.

"(5) Where a tremie is used, it should be kept filled with concrete up to the top of the water level, and the discharge end should be kept buried in the freshly deposited mass to prevent emptying and raised a few inches at a time as the filling progresses.

"(6) The surface of the concrete must be kept as nearly level as possible to avoid the formation of pockets which will retain laitance and sediment.

"(7) Where concrete is not deposited continuously, all sediment should be removed from the surface of the concrete, by pumping or otherwise, before depositing fresh concrete.

"(8) The concrete should be a 1:2:4 mixture and of a 'quaking' consistency.

"(9) Freshly deposited concrete should not be disturbed.

"(10) Where the flow of water through the pit cannot be prevented, concrete should be deposited in cloth sacks."

ELECTRICITY

The committee on electricity reported on clearances and transmission lines and crossings. In regard to clearances, the committee said that the last year's report on this subject had been one of progress only because it had taken up the matter with committees on clearances of the American Railway Association and the American Electric Railway Engineering Association. During the past year it had had communications with these committees and was now prepared to recommend clearance lines for the equipment and permanent way structures adjacent to third-rail and for third-rail structures. It was believed that similar diagrams would be recommended to the American Railway Association by its committee on electric working and by the committee considering the subject of clearance of the American Electric Railway Engineering Association.

Diagrams were obtained from all the principal railways in the United States using third-rail showing outlines of their third-rail structures and from some of the principal steam railroads diagrams showing outlines of maximum equipment. These various diagrams were made a part of the report and were used as a basis in establishing clearance lines for third-rail structures, permanent way structures adjacent to third-rail and equipment. A proposed standard clearance diagram was presented. The company also submitted a table showing that there were twenty-seven third-rail electric railways, operating 1988 miles of track. These twenty-seven railways consisted of eleven interurban lines, eight elevated or subway lines and eight trunk lines, viz. the Baltimore & Ohio Railroad, Long Island Railroad, two divisions of the Pennsylvania Railroad and four divisions of the New York Central Railroad. The committee disregarded the elevated and subway lines and one of the interurban lines, the Grand River, Grand Haven & Muskegon Railway, because these lines do not use any steam equipment. This reduced the number of companies interested to

eighteen. The clearance lines proposed by the committee would then be satisfactory to all of the trunk lines mentioned and also to three interurban lines as follows: Albany Southern Railroad, Central California Traction, and Scioto Valley Traction. They could not be used on the remaining seven interurban lines as follows: Aurora, Elgin & Chicago Railroad, Lackawanna & Wyoming Valley Railroad, Michigan United Railways, Northern Electric Railway, Puget Sound Electric Railway, Philadelphia & Western Railway, Wilkes-Barre & Hazleton Railway.

In its discussion of definitions the committee said that at the last meeting of the association the definition for third-rail gage was adopted as follows: Distance, measured parallel to plane of top of both running rails, between gage of running rail and center line of third rail.

The committee proposed changing the definition to read as follows: Third-Rail Gage.—Distance, measured parallel to plane of top of both running rails, between gage of nearest running rail and inside gage line of third rail.

TRANSMISSION LINES AND CROSSINGS

On this point the committee reported that the sub-committee chairman, Mr. Coombs, had been working in conjunction with committees of the National Electric Light Association, American Institute of Electrical Engineers, American Electric Railway Association, Association of Railway Telegraph Superintendents and representatives of the telephone and telegraph companies, in connection with the preparation of specifications for overhead crossings of electric light and power lines. As a result specifications were submitted which were identical with the specifications that had been adopted by the other associations mentioned, excepting in paragraphs Nos. 10, 13, 18, 24, 29, 31, 32, 34, 45, 49, 51, 55, 60 and 61. These paragraphs, as recommended by the committee follow, and the committee believes that they will make the specifications more satisfactory from the point of view of the railroads.

"(10) The clearance of alternating-current circuits above any existing wires, under the most unfavorable condition of temperature and loading, shall be not less than 8 ft. wherever practicable. For constant potential, direct-current circuits, not exceeding 750 volts, the minimum clearance above telegraph, telephone and similar wires may be 2 ft. with insulated wires and 4 ft. with bare wires.

"(13) The clearance in any direction between the conductors nearest the pole, or tower, and the pole or tower shall be not less than:

"Line Voltage.	Clearance.
"Not exceeding 10,000 volts	9 in.
"Exceeding 10,000, but not exceeding 14,000 volts	12 in.
"Exceeding 14,000, but not exceeding 27,000 volts	15 in.
"Exceeding 27,000, but not exceeding 35,000 volts	18 in.
"Exceeding 35,000, but not exceeding 47,000 volts	21 in.
"Exceeding 47,000, but not exceeding 70,000 volts	24 in.

"(18) Strain insulators shall be used in guys from wooden poles carrying any power wire of less than 6600 volts, provided the guys are not through grounded to permanently damp earth. Strain insulators shall not be used in guying steel structures, nor required on wooden poles carrying wires, all of which are 6600 volts or more, provided the guys are through grounded to permanently damp earth.

"(24) If required by contract, all material and workmanship shall be subject to the inspection of the company crossed; provided that reasonable notice of the intention to make shop inspection shall be given by such company; if such notification is not given, the company crossed shall be furnished with certified reports of shop inspection of material and workmanship made by a properly qualified inspector. Defective material shall be rejected and shall be removed and replaced with suitable material.

"(29) Insulators, pins and conductor attachments shall be designed to withstand, with the designated factor of safety, the tension in the conductors under the maximum loading, assuming the conductor to be broken on one side of the structure.

"(31) The poles, or towers, shall also be designed to withstand the most unfavorable condition of the loads specified in paragraph 30, combined with the unbalanced tension of

"Two broken wires for poles or towers carrying five wires or less.

"Three broken wires for poles or towers carrying six to ten wires.

"Four broken wires for poles or towers carrying eleven or more wires.

"(32) Cross arms shall be designed to withstand the loading specified in paragraph 30, combined with the unbalanced tension of the wire, which, when broken, produces the highest fiber stress in the arm.

"(34) The ultimate unit stress divided by the allowable stress shall be not less than the following: wires and cables, 2; pins, 2; insulators, conductor attachments, guys, 3; wooden poles and cross arms, 6; structural steel, 3; reinforced concrete poles and cross arms, 4; foundations, 2.

"Note.—The treating of wooden poles and cross arms is recommended. The treatment of wooden poles and cross arms should be by thorough impregnation with preservative by either closed or open-tank process. For poles, except in the case of yellow pine, the treatment need not extend higher than a point 2 ft. above the ground line.

"(45) For voltages of 5,000 and over insulator pins shall be steel, wrought iron, malleable iron, or other approved metal or alloy, and shall be galvanized, or otherwise protected from corrosion. Pins shall be locked with cotter, nut or other device, to prevent rising out of the socket or hole in the cross arm.

"(49) Wooden poles shall be of selected timber of approved species, peeled, free from defects which would decrease their strength or durability, not less than 7 in. minimum diameter at the top, and meeting the requirements as specified in paragraphs 17, 30, 31 and 34.

"(51) Structural steel shall be open-hearth, in accordance with the Manufacturers' Standard Specifications.

"(55) The length of a main compression member shall not exceed 150 times its least radius of gyration. The length of a secondary compression member shall not exceed 180 times its least radius of gyration.

"(60) The foundations for steel poles and towers shall be designed to prevent overturning. The weight of concrete shall be assumed as 140 lb. per cubic foot. In good ground, the weight of 'earth' shall be assumed at 100 lb. per cubic foot. In swampy ground special measures shall be taken to prevent uplift or depression.

"(61) The top of the concrete foundation, or casing, shall be not less than 12 in. above the surface of the ground or extreme high water."

RAIL

This committee submitted a revised set of specifications for steel rails, reported progress on recommendations for standard rail sections and will continue investigations of the breakage and failure of rails. M. H. Wickhorst, engineer of tests for the rail committee, presented a very interesting paper on the "Influence of Rolling Temperature on the Properties of Bessemer Rails."

In a supplementary report on rail, papers by P. H. Dudley on "The History, Development and Use of Rails by Railroad Companies of the United States from 1830 to Date," by Thomas H. Johnson on the "Investigations of Steel Rails by the American Society of Civil Engineers," and by W. C. Cushing on "The Question of Improvement of Rail Design and Specifications from 1893 to the Present Time," were presented.

WOOD PRESERVATION

This committee's recommendations to the association included a set of rules covering the general principles of the grouping of timbers for antiseptic treatment, as follows:

"(1) Ties of approximately the same period of seasoning should be grouped together for treatment; green ties should never be mixed with seasoned ones.

"(2) Pine ties should be separated on the basis of heartwood and sapwood; it would also be advisable in some cases to group hard woods on the same basis, but it is not generally practicable to do so.

"(3) Grouping on the basis of species and families, as, for example, red oaks, pines, beeches, etc., if a further division into hard wood classes is made with pine, is usually a satisfactory practice. From this it follows that red oak, beech, long-leaf pine, loblolly pine and gum should be treated separately. Birch and hard maples and certain other combinations, depending on the locality, can be grouped together to advantage.

"(4) The separation in the yard, on the basis the ties are to be grouped for treatment, is an essential and economical practice."

This committee also recommended that the first clause in the adopted specifications for creosote oil provide that it shall be a pure product from coal gas, tar or coke oven tar. In addition to the changes in the standard specifications, two specifications were presented and recommended for adoption which would cover cases where higher grade oil could not be procured, but it further recommended that consideration should be given to the use of a greater quantity of creosote oil per cubic foot than required under the standard specification. The new standard specifications recommended for creosote oil follow:

"The oil used shall be the best obtainable grade of coal-tar creosote; that is, it shall be a pure product obtained from coal gas tar or coke oven tar and shall be free from any tar, oil or residue obtained from petroleum or any other source, including coal gas tar or coke oven tar; it shall be completely liquid at 38 deg. Cent. and shall be free from suspended matter; the specific gravity of the oil at 38 deg. Cent. shall be at least 1.03. When distilled by the common method—that is, using an 8-oz. retort, asbestos covered, with standard thermometer bulb ½ in. above the surface of the oil—the creosote, calculated on the basis of the dry oil, shall give no distillate below 200 deg. Cent., not more than 5 per cent below 210 deg. Cent., not more than 25 per cent below 235 deg. Cent., and the residue above 355 deg. Cent., if it exceeds 5 per cent in quantity, shall be soft. The oil shall not contain more than 3 per cent water."

THE STORAGE BATTERY IN RAILWAY SERVICE

A paper on "The Storage Battery in Railway Service" was presented to the association in a special bulletin, No. 145, whose introduction reads as follows:

"The storage battery is rapidly coming into prominent use in various operations in railway service, such as train lighting, station lighting, signaling and interlocking, operation of drawbridges, motor truck and motor car propulsion, telephone and telegraph work, supplementing the load on current supply systems, and numerous other uses to which it is readily adapted.

"A brief outline of the theory and principal characteristics of the storage battery is herein submitted with the thought that it would prove of some service to the engineer in solving the problems that daily confront him in his work. An effort has been made to present the subject in an elementary form and as briefly as consistent, and although the entire subject is not fully treated, it embodies the essential features of a branch of the electrical field which is daily becoming more and more important in railway operation."

Mr. Fritch then went into the historical development of the storage battery from the discovery of the principle by Gautherot in 1801 to the Edison battery of to-day. He discussed the theory and principles involved in the different types as well as some of the reasons for failure of their proper operation. He described the methods of control and the applicability of the storage battery to various uses and dwelt on its application to railway service in train lighting, signaling, drawbridge operation, lighting of stations and terminals and storage battery traction. In referring to storage battery traction under steam railroad conditions he said: "Some experiments are also being made with storage battery cars on branch lines of steam railroads, where the traffic is light and only infrequent service is maintained. It is probable that in many such situations the storage battery car will prove to be the most economical method of providing for the passenger service from a commercial standpoint. The cost of labor and power will be less than for locomotive operation, and the initial investment will, in many cases, be considerably less than that required for equipment with the overhead trolley, particularly where power can be purchased from a local lighting company, at a low rate, during the hours when the lighting load is a minimum and, therefore, no investment for additional machinery is called for."

ELECTRICAL NIGHT AT THE NEW YORK RAILROAD CLUB

The eighth annual electrical night of the New York Railroad Club was held on Friday, March 15. The principal feature of the evening consisted of progress reports by Messrs. Gibbs, Murray and Katté, the engineers who are actively connected with the electrification work of the Pennsylvania, the New York, New Haven & Hartford and the New York Central & Hudson River Railroads respectively. The principal data submitted by these speakers are presented hereinafter. The other speakers of the evening were W. J. Harahan, vice-president Erie Railroad and chairman of the New York Railroad Club's committee on electric traction; William McClellan, engineer Public Service Commission, Second District, New York; B. F. Wood, assistant engineer Pennsylvania Railroad; C. O. Mailloux, consulting engineer, New York; Frank Hedley, vice-president and general manager Interborough Rapid Transit Company, and Calvert Townley, president Lackawanna & Wyoming Valley Rapid Transit Company. There was a general agreement that steam railroad electrification, both direct-current and single-phase, had amply demonstrated its reliability, and that the paramount question for given cases now was whether the economies and increased earnings of electric service were great enough to offset the additional investment. In the latter connection Mr. McClellan suggested that the steam railroads, where feasible, buy their power from some central station. Mr. Wood went still further along these lines by suggesting the possibility of a car trust. If these methods could be followed, the steam railroads would not have to invest such enormous sums for electrification.

George Gibbs, chief engineer electric traction of the Pennsylvania Railroad, gave some figures to show the operating results which have been obtained recently in the New York terminal operation of the Pennsylvania Railroad and on the Long Island Railroad. In introducing them he said that he considered them favorable, but in all probability they would be more favorable in the future. Earlier figures on the Long Island and the West Jersey & Seashore Railroads had been presented by him at the 1910 International Railway Congress held at Berne, Switzerland. The 1911 record of the Long Island Railroad showed 152 miles of electrified main track; 8,600,000 car miles; operating cost, including all regular interstate commerce headings and depreciation, 24.2 cents per car mile; cost of electrical energy at the car shoes, 1.02 cents per kw-hr.; cost of power per car-mile run, 3.12 cents. There were 269 mechanical and electrical failures. The train mileage between detentions was 8000 miles and the car mileage between detentions 28,000 miles. The average time between detentions was twenty-nine hours. Compared with the earlier performances, he had found that, despite the doubling of the mileage, the failures had decreased and the train mileage made between failures had nearly tripled. The cost of maintenance had decreased 10 per cent, but the car-mile cost of

power had increased 13 per cent on account of larger cars. The cost of power delivered at the shoes had decreased 22 per cent. The West Jersey & Seashore service showed similar improvement.

Continuing, Mr. Gibbs said that the New York terminal service of the Pennsylvania Railroad had been in complete operation for over a year. The figures for the first twelve months covered 9 miles of main line from Manhattan Transfer (near Newark), about 6½ miles of which were on level track and 2½ miles on heavy tunnel grades. In addition, there was an eastward underground run of 4 miles from the terminal to the storage yards on Long Island. Practically all traffic was handled by locomotives, although there was some motor train service between Manhattan Transfer and New York. In general, the requirements called for much switching and transfer work. Owing to the fortunate condition that the tunnels had been kept much drier than anticipated, the higher coefficient of adhesion permitted the d.c. locomotives employed to start a 650-ton train readily. Even 800-ton trains had frequently been hauled by a single locomotive. Because of the service limitations, the average locomotive performance per annum was only 26,000 miles and the maximum 56,000 miles. The total annual performance was 909,000 miles, of which 650,000 miles was road service. About 28 per cent of the mileage was purely switching service.

In giving the operating costs per car mile of the electric locomotives, Mr. Gibbs compared them with like costs of steam locomotives operated on the New Jersey division and on all divisions of the Pennsylvania as follows: Electrical, 5.91 cents; New Jersey steam division, 8.83 cents, and all steam divisions, 11.9 cents. The cost of electric locomotive lubrication was 0.25 cent, the same as for all divisions. On the other hand, the engine house expense was 0.58 cent per car mile as compared with 2.58 cents for both the New Jersey and the assembled divisions. It should be stated that the steam locomotive charges were taken from pooled figures, as the Pennsylvania Railroad does not segregate locomotive repairs according to the class of service.

Mr. Gibbs thought that the figure for electric locomotive repairs was probably higher than many had expected, and he admitted that it was higher than some electric locomotive figures that he had heard of before. Yet he considered the present costs low for such exacting service, especially in view of the fact that during the first year there were many costs that would not arise in the future. The heaviest items were for brakeshoes, tire turning and structural changes. Thus some of the motor shafts were found to be out of tram and the jack-shaft bearings had an unsuitable metal which had to be replaced with new babbitt. Furthermore, many flat wheels were due to the condition that the original brake rigging was out of proportion in some respects. These defects made it necessary to send every locomotive through the shops for a general overhauling before its time.

The engine house expense for the electric locomotives was very low because they required few facilities beyond a shelter with an inspection pit. Locomotive inspection was conducted on the tracks by one man. A detail inspection over the pit was made every 2500 miles, when the motors and control were blown out, brakeshoes and contact shoes renewed and minor changes made. This detail inspection required the services of four electrical and three mechanical men for about four hours. The original inspection period was but 800 miles. During the past year there had been only sixteen failures, which detained twenty-six trains at an average of 6.8 minutes per detention. There were about 35,000 train miles per train detention and about 56,000 train miles per locomotive failure.

W. S. Murray, electrical engineer New York, New Haven & Hartford Railroad, presented a large number of lantern slides to show the advances which had been made in the simplification of single-phase line construction for the New York, New Haven & Hartford Railroad's extensions, including the New York & Harlem River Branch, the Hoosac Tunnel electrification and the New York, Westchester & Boston Railway. In accordance with a suggestion made by E. H. McHenry, one of its vice-presidents, the New Haven Company was considering a change in its system from 11,000-volt two-wire to 22,000-volt three-wire without any change in insulators. The track would be used as the neutral of the three-wire system, and the eastbound contact wires would be the outgoing circuits and the westbound wires the incoming circuits of the outer leads. Mr. Murray said that his company was operating 114 miles of track in 1912, but in 1913 the total distance would be 552 miles. Likewise the power house capacity was to be increased from 21,000 hp to 46,000 hp, the locomotive capacity from 41,000 hp to 128,800 hp and the locomotive mileage from 1,569,648 miles to about 5,489,856 miles.

E. B. Katté, chief engineer electric traction of the New York Central & Hudson River Railroad, presented some data on the growth of the company's electrification zone. During the past year 5¾ miles of route had been added by extending the Hudson Division electrification from Hastings to Tarrytown, which made a total of 182 miles of electrified single track. In addition, 9¼ miles of transmission line had been added from Glenwood to Tarrytown, a substation had been built at Irvington and a storage battery installed at the Fiftieth Street substation, New York, to take the place of one wrecked by a Pintsch gas explosion. Speaking of service reliability, Mr. Katté said that in the entire five years of electric operation not a single delay had been caused by the power generating system. Last summer the excessive heat had played havoc with the varnished cambric cables, thereby causing two-thirds of all troubles. During 1912 the average maintenance car-mile cost of locomotives was 3 cents, and of cars 2.1 cents. The total locomotive mileage for 1911 was 1,303,530 miles, and the total multiple-unit car mileage was 4,583,345 miles. During the year 10 miles of route, equivalent to 51 miles of single track, would be built to Croton, making a total of 233 miles. This would include 10½ miles of track in the Harmon shop yards, just south of Croton. In conclusion, Mr. Katté said that a bi-polar eight-motor locomotive was now under way for experimental service, that designs had been made for an all-steel motor car and that studies were under way of freight track electrification in New York and of self-propelled cars for branch lines.

STANDARD RAIL SPECIFICATIONS

The subject of standard specifications for girder rails is being considered by a sub-committee of Committee A1 of the American Society for Testing Materials, and the committee will probably present a report on this subject at the next convention of the society. The sub-committee has had presented to it the specifications offered by the way committee of the American Electric Railway Engineering Association in 1910, but will probably make some change in these specifications before indorsing them to the society for adoption. The sub-committee to which this work has been delegated is co-operating with the way committee of the American Electric Railway Engineering Association, so that the same set of specifications will probably be offered at the 1912 conventions of both associations for approval.

The Engineering Experiment Station of the University of Illinois has issued Bulletin No. 54 upon the mechanical stresses and transmission lines, by A. Guell. The bulletin discusses the effect of (1) dead weight, (2) wind pressure and (3) change of temperature in producing stresses upon the lines of wire. Copies of the bulletin may be obtained gratis upon application to W. F. M. Goss, University of Illinois, Urbana, Ill.

President Taft at New England Club Banquet

Chief Magistrate a Speaker at the Twelfth Annual Meeting and Banquet in Boston—Electric Railway and Public Questions Discussed by Thomas N. McCarter, Frederick J. Macleod, Judson C. Clements and Patrick Calhoun

The twelfth annual meeting and banquet of the New England Street Railway Club were held at the Hotel Somerset, Boston, on the afternoon and evening of March 19. The occasion was made unique among electric railway gatherings by the presence of the President of the United States, who made a strong speech on the public issues of the day and described the "progressive" ideas of the administration.

The election of officers was held in the afternoon, and the following were chosen for the ensuing year:

President, Thomas Lees, Lowell, Mass.; vice-presidents, A. E. Potter, Providence, R. I.; John R. Graham, Bangor, Maine; J. Brodie Smith, Manchester, N. H.; G. S. Haley, Rutland, Vt.; E. S. Wilde, New Bedford, Mass.; W. S. Murray, New Haven, Conn.; secretary, John J. Lane, Boston, Mass.; treasurer, E. P. Shaw, Jr., South Framingham, Mass.

Executive committee: Franklin Woodman, Haverhill, Mass.; Geo. M. Cox, Newtonville, Mass.; M. H. Bronsdon, Providence, R. I.; Fred F. Stockwell, Cambridgeport, Mass.; F. A. Persons, Maynard, Mass.; H. M. Steward, Boston, Mass.; Charles S. Clark, Boston, Mass.

Finance committee: Thomas Lees, Lowell, Mass.; C. E. Learned, Boston, Mass.; F. M. Nellis, Boston, Mass.

At the annual banquet, which was served in the ballroom of the Somerset, 590 members and guests were present. The decorations were elaborately planned in celebration of the club's "Federal Night," festoons of the national colors being draped behind the speakers' table and upon the walls and balconies. The main gallery was occupied by the ladies. A band furnished music and accompanied many popular songs arranged as hits upon prominent members. A large electric sign, surmounted by the initials of the club in letters of light, quoted President Taft's belief in equality of opportunity under law. The flag of California, displayed in honor of Patrick Calhoun, president United Railroads of San Francisco, was among the decorations.

PRESIDENT TAFT ON PROGRESSIVE ISSUES

The banquet had been under way about half an hour when the presidential party arrived. The Chief Magistrate was received with great enthusiasm and prolonged cheering. President Taft spoke for forty-five minutes in a characteristic vein, discussing with humor his qualifications for membership in the club as a "progressive" organization. He defended vigorously the policies of the administration as expressed in the efforts made to secure tariff revision along carefully considered lines and pointed out the advantages of a tariff board and the wisdom of amending the tariff schedule by schedule. He said that the corporation tax has added a revenue of $30,000,000 to the resources of the government. The President discussed briefly the policies of conservation and international peace and the subjects of postal savings banks, the recall of the judiciary and of judicial decisions, taking a firm stand for the constitution and the established methods of its application and advocating constitutional amendments rather than any popular recall program.

Mr. Taft reiterated his belief that checks against the impulsive action of the majority are necessary to provide time for the careful consideration of legislative measures and their interpretation, contended that the great body of the judiciary are high-minded, and suggested providing the machinery for an impartial trial of judges in cases where courts are charged with failing to meet their proper responsibilities.

Great applause followed the President's speech, and as he left the hall the members rose to a man and unanimously elected him an honorary member.

At the conclusion of the dinner, Franklin Woodman, the retiring president, introduced Mr. Lees, the newly elected head of the organization, who expressed his appreciation of the honor conferred upon him, and then presented Asa P. French, United States district attorney, Boston, as toastmaster.

Before calling upon the regular speakers Mr. French mentioned his relations with street railways in accident cases, and emphasized the fact that every verdict of $1,000 must be paid by the revenue derived from 20,000 passengers, or by the net income left after the cost of carrying from 75,000 to 90,000 people has been met.

THE OTHER SPEAKERS

Lieutenant-Governor Robert Luce was then introduced, and he presented the greetings of the Commonwealth of Massachusetts.

Judson C. Clements, a member of the Interstate Commerce Commission, was called upon next. He reviewed the growth of street railways, pointing out that the present single-track mileage in the United States covers about 40,000 miles, upon which 90,000 cars are operated, the total capitalization being over $4,500,000,000. He touched upon the advantages of interchange of traffic between electric and steam railways and advocated publicity as a policy tending to create better relations between operating companies and their patrons.

The problems of regulation were also mentioned, and Mr. Clements cited the difficulties of adjudicating questions of service and traffic facilities in the District of Columbia as an example of the conditions rendering it undesirable to prescribe rules of operation in great detail. He stated that the factor of courtesy on the part of employees is a momentous one in connection with public relations, and concluded with the statement that the latter are improving steadily in the light of a better understanding among all parties associated in the great work of electric transportation.

The next speaker was Thomas N. McCarter, president of the American Electric Railway Association, who expressed his pride in being associated with an industry which is so great a factor in the upbuilding of the world. Mr. McCarter then sounded a note of warning as to the future. New construction of electric railway lines has practically ceased at present. The causes, among other things, are too much politics, unrest, anti-corporation feeling and the expectation of too much from the nickel. Material and labor costs are rising constantly. By the steady growth of cities, annexation of suburban territory and extension of free transfer facilities the average haul per passenger is getting longer yearly, so that it is to-day more accurate to speak of a virtual 4-cent or 3-cent fare than a nickel fare. The modern theorist wants the service in a large city to be rendered on the basis of a 3-cent fare and universal transfer, a twenty-year franchise and an accumulating fund capable of retiring the capital at the end of the franchise life!

"This sort of person," said Mr. McCarter, "will have to wait for the consummation above outlined until he has reached a state where the cost of coal is no longer a factor in his calculations."

Mr. McCarter called attention to the growing appetite of the public for subways, which appears to be rapidly ap-

proaching the classification of disease. Demands are made for subways far beyond the ability of the communities to carry them, and even in New York City the financing of subway construction is a difficult and exacting problem. In closing, he paid a high tribute to the work of the late Senator George F. Hoar in opposing the direct election of senators, and urged the continued adherence of the country to the established methods of government.

Frederick J. Macleod, chairman of the Massachusetts Railroad Commission, spoke of the increasing disposition on the part of electric railway executives to please the public, the reflection of the executive personality in the corporate organization and its conduct of business, and the value of publicity. He disclaimed any desire to operate the companies under the jurisdiction of the board and emphasized the importance of good service.

Mr. Macleod paid a tribute to the courtesy, intelligence and efficiency of Massachusetts street railway employees, and pointed out the benefits of meeting the public through business associations, the complaint bureau, improvement associations and the press. He believed that the public demands the best possible service at the present rates rather than a poorer service at a lower tariff, and emphasized the need of educating the public to appreciate the abilities of the companies to give service at stated rates. Too often the community petitioning for a fare reduction gets the idea that the board should grant the request regardless of the effect upon the reasonable profits of the company.

Patrick Calhoun made an address upon the constitutional and judicial problems now before the country, urging that the proposed recall of judicial decisions would be a step toward chaos. He argued that under a government of law the minority is protected, and that a government in order to be of the people must be representative. In closing, he made a strong plea for business men who have been dragged into court by the modern interpretations of the Sherman law, contending that a former Supreme Court decision was sufficient justification for many practices that later were considered illegal. The business interests of the country are anything but criminal in intent.

Frank P. Bennett, Jr., Boston, was the last speaker on the program.

The committee on arrangements consisted of George W. Knowlton, Boston, chairman; Henry E. Reynolds, Charles S. Clark, J. D. Andrew, George C. Ewing, Charles C. Peirce, C. E. Learned and J. T. G. Nichols, Boston; E. P. Shaw, Jr., South Framingham, Mass.; F. F. Stockwell, Cambridgeport, Mass.; M. H. Bronsdon and A. E. Potter, Providence, R. I., and E. S. Wilde, New Bedford, Mass.

MEETING OF RAILWAY SIGNAL ENGINEERS

The Railway Signal Association, an organization of signal engineers of steam railways, held a meeting at the Congress Hotel, Chicago, on March 18.

Among the subjects on which reports were made and discussions held were: Contracts for the installation of interlockings; the preparation of the manual of the association, which will include all of its specifications; power interlocking; the automatic block, which included specifications for apparatus and materials; wires and cables, which reported on investigations made with regard to insulation; standard designs; storage batteries and a.c. signaling, which covered electric railway installations. The committee on the subject named last had been instructed to investigate the various systems in operation, study the materials and apparatus required and prepare certain specifications. The discussion on this report included remarks about the location of the blade in the different quadrants, the choice of frequency, relay specifications and wire.

The members of the association inspected the signal manufacturing companies' exhibits at the Coliseum.

CHICAGO MEETING OF THE BLOCK SIGNAL COMMITTEE

The joint committee on block signals of the American Electric Railway Engineering and the Transportation & Traffic associations met at the Congress Hotel in Chicago on March 19. The full membership of the committee attended. The members are as follows: J. M. Waldron, chairman, signal engineer Interborough Rapid Transit Company, New York; C. H. Morrison, signal engineer New York, New Haven & Hartford Railroad, New Haven, Conn.; John Leisenring, signal engineer Illinois Traction System, Springfield, Ill.; C. D. Emmons, vice-chairman, general manager Chicago, South Bend & Northern Indiana Traction Company, South Bend, Ind.; B. E. Merwin, general superintendent Aurora, Elgin & Chicago Railroad, Wheaton, Ill.; C. F. Conn, vice-president and general manager Lackawanna & Wyoming Valley Railroad, Scranton, Pa. On invitation of the committee the following signal manufacturers and engineers were present to participate in the discussion: E. J. Burke, president Blake Signal & Manufacturing Company, Boston, Mass.; Charles N. Wood, Electric Railway Signal Company, Boston, Mass.; W. W. Salmon, W. K. Howe, General Railway Signal Company, Rochester, N. Y.; L. Frederic Howard, H. W. Griffin, H. McCready, Union Switch & Signal Company, New York; Carl P. Nachod, Nachod Signal Company, Philadelphia, Pa.; M. H. Hovey, Madison, Wis.; John J. Ruddick, J. W. Putnam, United States Electric Signal Company, West Newton, Mass.; J. J. Hubbard, Federal Signal Company. L. E. Gould, Western editor Electric Railway Journal, Chicago, acted as secretary.

Mr. Waldron announced that the joint meeting with the manufacturers had been called particularly to obtain the manufacturers' ideas regarding standardization of signal aspects. It was very desirable at this time, when signaling was so rapidly becoming an important factor in electric railroading, that the association make certain recommendations as to uniformity in signaling and thus avoid the considerable confusion which had perhaps hindered the development of signaling on steam roads.

Mr. Morrison said that he had prepared blueprints illustrating his ideas of typical signal types for four electric railway conditions; the semaphore blades in these types were all arranged for display in the upper left-hand quadrant. On request of the chairman Mr. Morrison exhibited these prints and described the four designs, which were quite generally discussed by the committee and the manufacturers represented at the meeting.

The first signal shown was intended for use on a high-speed, electrically operated road which had its own private right-of-way. The design of this signal followed steam-railroad practice, except that it was arranged for two-position work. It had a standard semaphore blade. Mr. Morrison recommended the use of the upper left-hand quadrant because of the greater visibility that might be obtained on portions of electric roads where the poles were close to the track. He said that he wished the members to consider only the aspects of this signal. The mechanism by which the blade would be operated was immaterial at this time. Probably, however, on the high-speed roads track circuits would be used for control and electric motors for operating the signals. The mechanism case could be designed so that it would be bracketed on to a trolley pole and thus save the cost of a separate pole. Some of the committeemen questioned the advisability of supporting signal mechanisms on the poles which also carried the overhead or transmission wires. The vibration caused by the passage of a car or the wind on the wires might cause failure of the signals to operate properly.

The second type of signal which Mr. Morrison displayed was suggested for use on low-speed, private right-of-way

interurban roads. Its arrangement was similar to a steam railroad type of dwarf signal with the blade in the upper left-hand quadrant arranged for movement from 0 deg. to 45 deg. This signal would be supported on a bracket on one of the trolley poles. The blade and lens in the signal were smaller than those in the one for high-speed work.

For an alternative to be used on the medium-speed road, Mr. Morrison suggested the use of a light signal with lamps inclosed in a box supported on a bracket attached to a trolley pole.

The fourth type suggested by Mr. Morrison would have either a light or a blade indication, or both, as desired. This type would be suited for lines operating on highways and on city streets.

Mr. Morrison said that the object which he had in mind when he prepared these typical signal aspect drawings was to assist the committee and the manufacturers in choosing standard aspects or pictures to which they could all work. If the signal displays presented to motormen were very nearly uniform on most of the roads, then the problem of standard rules would be simplified greatly. As a word of explanation, he said that the square-ended signal displayed indicated "stop and stay," and that the pointed-end boards indicated "stop and proceed."

Mr. Morrison next described an automatic block signaling scheme for which the circuits had been worked out and tested. This method of signaling would use small semaphores and was designed for counting cars in and out of the blocks. A car inside a block would be protected by horizontal blades at both ends of that block, and a car following the first car would, on reaching the signal, see the block go to clear and then return to stop, thus indicating that the car in the block was moving away from the car which desired to enter. Cars running in opposite directions would at all times be separated by stop signals. This system was controlled by trolley contacts, or by short track-setting sections.

In a general discussion on signal aspects, Mr. Waldron pointed out that on high-speed interurban roads the signals should be readable at such distances that no slacking of speed would be required, otherwise the signals would interfere with traffic. It was the opinion of several that the vertical position of the signal was not so arrestive on an interurban line as the 16 deg. or 45 deg. position because of the close proximity of the signal blade to the pole line. E. J. Burke, of the Blake Signal & Manufacturing Company, spoke a word of caution regarding mounting signal mechanisms and apparatus on the trolley poles. Usually these poles were not rigid enough to afford the proper support for signal mechanism. A separate pole should be set for this purpose. Mr. Morrison had found that even on some portions of an electrified steam line there was not sufficient clearance between the cars and the poles for setting the signals inside of the pole line. When questioned by the chairmen, Messrs. Emmons, Leisenring, Conn and Merwin stated that they did not believe a 90 deg. indication could be seen as well as a 45 deg. or 60 deg. indication on an electric road operated by an overhead trolley. Mr. Howe stated that he had been interested in some work for electric roads using the vertical position and had found no trouble in seeing the signals. Mr. Merwin said that his company was now figuring on the installation of some signals on parts of its double track, and that three-position signaling would have to be used on account of the following movements of trains.

Mr. Salmon said that the question of the kind of motive power did not have much effect on the choice of signals, provided the speeds on an electric line were the same as on a steam line. There were other things to be considered, however, such as the pole-line location. He thought that, notlines, the committee should devote its attention to presenting withstanding the variety of conditions existing on electric to the electric roads any and all means for proper signaling that the steam roads have found satisfactory. He did not think that the committee should limit the electric roads by being too strict in its recommendations for the use of any particular aspect or signal arrangement. That there was a difference in motive power was not the reason for changing the aspects on electric roads from those used and found desirable on steam roads. Of course, it would be necessary to design the aspects for some roads so that they would best suit local conditions, but he did not think it desirable for the committee to limit the roads to any great extent. He was highly in favor of the broad principle of standardization wherever that could be adopted.

L. F. Howard said that electric roads in choosing signals would probably be governed largely by physical conditions. Any recommendations as to practice that the committee might make should be worded to cover a wide range of conditions rather than limit the roads to the choice of a few systems or types.

Mr. Nachod said that in studying signaling he had recently walked over a portion of the Illinois Traction System signal territory in order that he might see exactly how these signals operated, and he had noted that it was a problem to make the signal stand out when placed close to the track and very nearly in line with the trolley poles and overhead brackets. On the Illinois Traction System a great deal of the arrestiveness of the signal was given by its bright red color.

Mr. Hovey said that some electric roads now needed three-position signaling on account of the close following movement of trains, and that the recommendations of the committee should cover that form of signaling. He preferred the use of a single arm instead of two for three-position signaling.

Mr. Ruddick said that his company had been working on three-position signaling. Mr. Putnam did not think that the electric roads could get along with two-position signaling if they wished to count cars.

Mr. Emmons called attention to the great amount of shifting between roads that is done by the crews of the electric cars, that is to say, the stability of employment is not nearly as great on an electric road as it is on a steam road, and thus it was even more desirable to have uniformity of signal aspects on electric roads.

Mr. Nachod thought that a signal of the car-counting type should have a different aspect than one of the regular blocking type. Mr. Waldron did not agree and said that the committee was anxious to standardize so far as possible all signals of the light type and all signals of the blade type.

Mr. Howe pointed out the necessity for recognizing the Interstate Commerce Commission's clearances when locating signals. A general discussion then followed on the relative location of signals, telephone, feed and transmission wires.

Mr. Nachod read a contribution on "Aspects of Signaling Single-Track Electric Roads and Reasons Therefor." He was instructed to send copies of this to the committee members. Mr. Nachod when questioned said that signals controlled by trolley contacts were operating satisfactorily at 55 m.p.h.

Mr. Ruddick said that the trolley contact manufactured by his company was a rigid switch driven by the trolley wheels. It had been found difficult to get a contact of the other type long enough and light enough to withstand high-speed operation.

Mr. Wood stated that the contactor which forms a part of the Chapman signal system was suited for operation at speeds of 30 m.p.h. and under.

The committee recommended that Mr. Morrison prepare new signal designs, which would include the ideas as expressed at the Chicago meeting, and each member of the committee was instructed to send Mr. Morrison a cross-section drawn to scale of the track of the road with which he was connected.

Mr. Salmon suggested that the committee should recommend to the electric roads that they follow the R. S. A. standards so far as local conditions would permit.

The committee then went into executive session and later announced that it had discussed the matter of data sheets and the preparation of a report for presentation at the Chicago convention this fall.

Mr. Conn reported on the collection of data in reference to rulings of the State and United States commissions. He had obtained considerable material which he was working into shape for his section of the report.

Messrs. Merwin and Leisenring had taken up with the signal companies the matter of designs of signaling lay-outs for typical track arrangements. They had not been able to obtain this information by letter, but thought they could get it on personal requisition. It was suggested that the members of the committee prepare typical lay-outs to answer the questions of last year's committee report and then submit these lay-outs for the approval or suggestions of the signal manufacturers.

THE AMERICAN RAILWAY ENGINEERING ASSOCIATION PROCEEDINGS

The Tuesday session of the thirteenth annual convention of the American Railway Engineering Association was held at the Congress Hotel, Chicago, March 19. The meeting was called to order by President W. C. Cushing, who proceeded with the annual address of the president after the minutes of the last convention were read and approved.

Mr. Cushing's address covered the present financial status of the association. He said that the membership had passed the 1000 mark. In the early days, when the association was not so large, a cash surplus was accumulated, but in the last three years the amount of printed matter had grown to such an extent that the expenditures had exceeded the receipts. He then suggested ways and means for reducing the printing costs and in other ways to increase the net receipts. Mr. Cushing closed his address by reviewing the progress in engineering work in the railway world in the past year.

The report of the committee on rules and organization was received and discussed. Only minor changes were made in the general rules for the government of employees, the most important of which was the elimination of the sentence in paragraph 14, "The heart side of the ties must be turned down," and inserting in its place "Ties must be laid to obtain the best bearing."

The signals and interlocking committee reported on the result of its investigation of outline and description of a comprehensive and uniform signal system suitable for general adoption. The committee submitted a revised table of insulation resistances which was approved and adopted for publication in the *Manual*. This committee also submitted schemes of aspects, but as the members were unable to agree on their form the committee was instructed by the association to continue its investigations and make further reports.

The committee on iron and steel structures reported specification for the erections of railway bridges, and after a lengthy discussion paragraphs 20 and 21 were eliminated from the specification. The report was then adopted in its revised form for publication in the *Manual*.

The report of the committee on wooden bridges and trestles was accepted as a progress report.

The ballast committee's report covered the results of a series of tests on ballast depth, but was not considered conclusive enough to provide definite recommendations. The committee recommended further investigations of the amount of sand, dust and clay permissible in good gravel ballast. The recommendations were adopted by the association.

The report of the committee on ties and their renewal by the single or continuous stretch methods was discussed at length. The conclusions were adopted as presented.

The committee on track reported a set of specifications covering material and workmanship for frogs, crossings and switches. The revised plans for Nos. 8, 11 and 16 rigid frogs and No. 11 spring frog were adopted as good practice after a short discussion. The general specifications for frogs and crossings and the lengths of switches were also adopted after minor changes had been made.

WEDNESDAY SESSION

The masonry committee's report on patching and repairing reinforced concrete and methods of depositing concrete under water was adopted by the association.

The report of the committee on electricity was received with much interest and after the clearance recommendations were adopted the association took up the specifications for transmission lines and crossings. The members discussed the advisability of accepting the paragraphs wherein the specifications differed from those adopted by the other associations. After considerable debate all paragraphs except No. 18, which had been adopted by the other associations, were accepted by the association.

It seems that in the general conference between the American Railway Engineering Association sub-committee of the committee on electricity and the committees representing other associations it was agreed that if this association would accept all other paragraphs except No. 18 the other committees would accept No. 18 in the revised form. The association after a long discussion decided it could not accept paragraph 18 as adopted by the other associations and adopted the specifications approved by it as a whole with this one exception.

The report of the committee on rail, also presented on Wednesday, contained some revisions to the specifications. These revisions were accepted with minor changes. The advisability of depending on drop tests for an indication of the resistance of the material used in rails was discussed at length by James E. Howard, of the Bureau of Standards. He seemed to discredit their value for this purpose, but found that the most useful function of the drop test was in the opportunity it gave to inspect the fracture and discover whether the rail was made of sound steel. The new specification provides for testing to destruction the test pieces which do not break under the first or subsequent blows, in order to determine whether the interior metal is sound.

The report of the wood preservation committee was received at the Thursday session and adopted for publication in the *Manual* without change. There was considerable discussion, however, over the advisability of adopting the two specifications for creosote oil. It was finally decided that they were of commercial value where the better grade of oil could not be procured or where the cost of creosoting would be reduced as a result of using the lower grade oil.

BANQUET AND ELECTION OF OFFICERS.

The annual banquet of the association was held on Wednesday night in the Gold Room of the Congress Hotel. President Cushing acted as toastmaster. Addresses were made by L. F. Loree, president Delaware & Hudson Railroad; Hon. F. D. Monk, K. C., M. P., Minister of Public Works of Canada, and Ray Morris, of White, Weld & Company, bankers, New York. Mr. Loree spoke on the labor union, Mr. Monk described the work his commission was doing in Canada and Mr. Morris talked on railway development from a banker's standpoint. At the close of the banquet the following officers were announced as elected for the ensuing year: President, Charles S. Churchill, chief engineer Norfolk & Western Railway; vice-president, W. B. Storey, vice-president Atcheson, Topeka & Santa Fé Railroad; treasurer, George H. B. Remener, engineer Illinois district Chicago, Burlington & Quincy Railroad. Secretary E. H. Fritch was re-elected.

Meeting of the Illinois Electric Railways Association

A Report of the Proceedings at Chicago on March 22, with Abstracts of Papers Discussing the Subject of Parks—Interchange of Business with Steam Roads

The Illinois Electric Railways Association met at the La Salle Hotel, Chicago, Ill., on March 22. President Edwin C. Faber presided. Robert Barnett reported briefly to the association regarding the recent organization meeting of the auxiliary traffic association, which was held at Springfield, Ill., and the consideration by this association of the subject of uniform mileage books.

Lawrence E. Gould reported for the block signal committee that the committee was at work on an analysis and an abstract of the report presented by the signal committee of the American Electric Railway Association at the convention of that organization at Atlantic City last October. The committee is also considering developments that have taken place since that time.

F. E. Fisher and Edwin C. Faber discussed the advisability of a compilation of data showing the magnitude of the electric railway industry in the State of Illinois.

There was a general discussion on the subject of interchange arrangements with steam roads. Representatives of the Chicago, Ottawa & Peoria Railway and the Aurora, Elgin & Chicago Railroad announced that these companies had perfected arrangements recently for the interchange of business and had the names of their stations placed on the tariffs of the Elgin, Joliet & Southern Railroad, which connects with all steam railways entering Chicago.

The subject of parks was discussed in papers presented by the following: "The Operation of a High-Class Suburban Park," by A. W. Jordan, traffic agent Chicago & Joliet Electric Railway; "Developing Profitable Summer Excursion Business," by C. C. Schockley, general freight and passenger agent Rockford & Interurban Railway; "Interurban Outings," by A. E. Blackburn, traffic manager Chicago, Ottawa & Peoria Railway. Abstracts of these papers are published below.

THE OPERATION OF A HIGH-CLASS SUBURBAN PARK

A paper on the subject "The Operation of a High-Class Suburban Park" was presented by A. W. Jordan, traffic agent Chicago & Joliet Electric Railway and superintendent of that company's pleasure ground known as Dellwood Park. Mr. Jordan said that, except in the very largest cities, experience had shown that the big amusement park with great outlay for riding devices, shows, traveling bands, multitudes of concessions, extra cars and wages was a thing of the past. Notwithstanding this, he thought that there was a place for a park on nearly every road—not one with the Midway Plaisance style of entertainment, but a picnic ground with a combination of limited but standard amusements, or, better, a park with a permanent camp site.

The new park must first of all be an attractive place, well wooded and undulating, adjoining a lake or river if possible. It should also have an ample supply of pure drinking water, plenty of lunch tables and benches, rain shelters, good toilet and sewage facilities, a baseball diamond, a dancing pavilion and a refreshment building. If the patronage to be secured did not warrant this equipment, it was not worth striving for. Instead of installing a great many concessions at once, it would be better to begin with a few and add new ones from time to time in accordance with the developing taste of the public.

If much evening business was wanted, the park should not be more than 5 miles from the principal city and the fare not more than 5 cents or 10 cents. Music would be necessary for night business, but it should not be free. Even if it was heard outside of an inclosure there would be enough people willing to pay 5 cents or 10 cents each to return at least a part of the outlay. If picnic excursion business was an object, the round-trip fare must not be more than 50 cents for adults and 25 cents for children. As this travel is largely obtained through schools, lodges and clubs, the latter might receive a discount sufficient to pay for prizes, badges and advertising. He did not advocate making the cut rates for long hauls on Sundays and holidays, but only when the business must be vigorously coaxed.

A permanent camp in a park was a good thing because it meant steady everyday business. It would be desirable to confine the camp to a certain portion of the grounds and manage it in co-operation with a committee composed of campers who held leases for more than a year. In this way it would be possible to keep out undesirable residents.

A park filled with sensational amusements demanded constant and extensive advertising, whereas a park conducted with permanent though modest attractions required little more advertising than that offered by a good illustrated booklet and timetable. Personal letters followed by calls from a solicitor on representatives of schools, lodges, clubs and other societies were most effective in securing picnics. Small display advertisements in fraternal society papers were also helpful and usually inexpensive.

In the case of an evening park, daily newspaper advertising and a weekly change in the program were indispensable. A couple of vaudeville acts, some motion pictures or a one-act thirty-minute play in addition to the band concert would be heavy enough for the enjoyment of most summer audiences. It was not good to keep park visitors too long in one place, for the more often they moved the more money would they spend. Billboard and window lithograph advertising might be used occasionally to advertise special holiday attractions such as aeroplane exhibitions or races.

Cleanliness was most important. Every morning the premises should be cleared of fruit skins, pickle bottles, pasteboard boxes and other debris. On big holidays this work should be done even while the grounds are being used. Orderliness was of equal importance, and intoxicating liquors should not be sold.

Dancing, refreshments and baseball had always been the staple favorites of the public. The first two afforded the best opportunity to secure an income to meet the park expenses. Nothing was more productive of net revenue than a well-built, well-regulated, open-sided, brilliantly lighted dacing pavilion which was supplied with four or five good musicians. It was better to charge 5 cents or 10 cents per couple per dance rather than to demand 25 cents or 50 cents for the evening. This would attract more patronage, give the visitors a better opportunity to move about the park and in the long run each individual would spend more money than before. The restaurant should be equipped to furnish lunches and soft drinks in wholesale quantities as well as refreshments in smaller quantities. If possible, all refreshment facilities should be kept at one place, as this might effect a considerable saving in wages. Baseball seldom brought any money for the park, but it was absolutely necessary to provide a diamond. He did not favor financing a ball team or promoting professional baseball further than to give the use of the diamond during some portion of each week.

The cost of operating a park depended so largely upon its size and the number and kind of its amusements that no statement of general application could be made. At Dellwood Park, however, about twenty men are employed for three or four weeks before its opening to clear the winter leaves from the woods, trim the hedges, set out new plants and otherwise get everything ready for Decoration Day. Afterward six men keep the park clean, cut the grass and weeds and maintain the buildings. He thought the number of men employed was very low because the park comprises sixty-five acres with many flower and shrubbery beds, walks and buildings.

In conclusion, Mr. Jordan said that a successful railway park should be one of nature's beauty spots, not spoiled in its adaptation for public use, not large enough to make the fixed charges burdensome; its buildings necessary and durable and its operation as inexpensive as was consistent with handling a good volume of business. Above all, the park should be known for its safety, order and cleanliness.

DEVELOPING PROFITABLE SUMMER EXCURSION BUSINESS

C. C. Schockley, general freight and passenger agent Rockford & Interurban Railway, presented a paper entitled "Developing Profitable Summer Excursion Business." He considered it a mistake for traffic agents to make any concessions to lodges or other organizations that meant a loss of money. It should be pointed out to the entertainment committees of such bodies that it costs a great deal of money to maintain a park and its special transportation service, and that the rates are as low as they can consistently be made. All such business should be handled on a ticket basis. A report of the actual ticket sales should be presented to the railway by the ticket sales committee on the day before the excursion so that satisfactory car arrangements could be made. All of his company's chartered-car business was handled on a guarantee of forty-five people, the approximate seating capacity of the cars. The fares for this business were slightly below regular rates. It was understood that to get this service and rate the organization must guarantee forty-five passengers, and all over forty-five must pay the same rate per passenger for equal accommodations. His company owned an amusement park at Rockford, Harlem Park, which was beautifully situated on Rock River in the 5-cent fare zone and but twenty minutes' ride from the city. During the busy season a three-minute to five-minute service was given. Despite the excellent service, the free band concerts, free open-air shows, the five-thousand-dollar dancing pavilion and many other attractions, the company lost about $1200 on an attendance of about 200,000 people. It would be necessary to spend $25,000 for new attractions this year, not because the old ones were worn out, but because the public had tired of them. If a company went into the park business at all, it should control all of the principal attractions so that it could dictate the policy of the park. Mr. Shockley thought it was a good thing for all traffic men to keep in close touch with chambers of commerce and commercial clubs of the different cities to secure patronage for Fourth of July celebrations, airship meets, automobile races, homecomings and fairs. All of these attractions could be advertised judiciously and would bring good business at regular rates.

In conclusion, Mr. Schockley made the following suggestions:

"Don't accept business that will lose you money.

"Don't solicit business that you cannot handle properly. It will hurt you.

"During the hurry and worry of summer traffic don't forget your regular patrons who spend their money with you 365 days in the year. Help to give them perfect service. If you own an amusement park in connection with your line, run it for all there is in it.

"Help to keep the smaller outing parks along your line clean and respectable. Advertise these places as the ideal spot for a day of recreation in the country. Make your rates as low as possible, yet high enough to make a little money."

INTERURBAN OUTINGS

A. E. Blackburn, traffic manager Chicago, Ottawa & Peoria Railway, presented a paper entitled "Interurban Outings." He stated that up to the present time 90 per cent of the interurban electric railway business had been the transportation of passengers from town to town for business or social purposes. Not enough attention had been given to developing family or individual outing traffic to delightful nature spots along the line, although year by year the number of people who wanted a change of scene at the week-end or on holidays was increasing. This was a profitable sort of business to cultivate because the revenue that it produced was in a certain sense "velvet." It could be handled on the regular cars as a rule, or with but little added service. It was the traffic man's parallel to the salesman's question, "Is there anything else you would like today?" That question had increased the sales beyond the point of the buyer's bare needs in many other lines of business, and he believed that it would also do so in electric railroading. Many of the places where individual groups might make holiday were so close to the big centers of population that the people living there actually overlooked them. As an instance, Mr. Blackburn said that if the average Ottawa man were asked where the best place to spend a quiet afternoon was he would probably mention some prominent place like Starved Rock or the Illini Camp. Yet, the best locality for a strictly family outing was really at Chautauqua Park. The outings to encourage were those that took the wife and children only a few minutes up or down a road on an afternoon car to a place where they could be joined later for supper by the husband, to conclude with a delightful ride home in the cool of the evening. The most effective advertising of outing business consisted in free newspaper items concerning the parties who took these little pleasure trips. An example of the kind of personal news which would be welcome by the local newspapers would be something like the following: "J. H. Mason and J. P. Jenkins and their families went down the interurban for a family picnic near Lock 12 yesterday afternoon. The party was arranged in honor of Mr. Mason's niece, Miss Birdie Mason, of Poughkeepsie, N. Y. Before their return they visited Starved Rock." Mr. Blackburn believed that if a traffic agent could have a string of such actual news items running in all the papers from time to time it would do more to foster the real outing business than all the red and green printed posters that ever left the press.

STEEL TIES IN LOUISVILLE

The Louisville (Ky.) Railway has purchased 2000 Carnegie steel ties as the result of a satisfactory experiment with steel tie and concrete construction which was made on one block of the Second Street line about a year ago. The new ties will be placed on the Bardstown Road extension for about ½ mile or more. The ties will be spaced 4 ft. centers instead of the 2-ft. spacing customary with wooden ties. Under Louisville conditions untreated white oak ties are said to become unfit for use within from seven to twelve years, according to the conditions of service.

At an extraordinary general meeting of the Underground Electric Railways, London, on Feb. 27, 1911, Sir Edgar Speyer presiding, the resolutions embodying the acceptance of the scheme for the acquisition of the ordinary stock of the London General Omnibus Company and for the increase of the capital of the Underground Electric Company, by the creation of "A" shares, was unanimously confirmed as special resolutions.

Exhibitors at Engineering Convention

Largest Display of Railroad Apparatus in History of the Appliance Association Made at Chicago This Week—Exhibits of Particular Interest to Electric Railways

The National Railway Appliance Association assembled the largest exhibition of railroad apparatus in its history, at the Coliseum, Chicago, during the convention of the American Railway Engineering Association this week. The following is a list of the exhibits which were of the greatest interest to electric railway companies:

Adams & Westlake Company, Chicago, Ill.—Signal lamps, lanterns, railway specialties.

Ajax Forge Company, Chicago, Ill.—Manganese frogs, Ajax manganese guard rail, adjustable switch rods, detector bars, braces, Ajax rail steel braces.

Alexander Crossing Company, Clinton, Ill.—Continuous-rail non-pounding crossings.

American Casting Company, Birmingham, Ala.—National lock joint cast iron culvert pipe.

American Guard Rail Fastener Company, Philadelphia, Pa.—Anchor guard rail clamps, tie-plate guard-rail fasteners and Vaughan automatic rail anchors.

American Hoist & Derrick Company, St. Paul, Minn.—Moving pictures showing American railroad ditcher.

American Iron & Steel Manufacturing Company, Lebanon, Pa.—Track bolts, screw spikes, cut spikes, tie rods, castellated nuts.

American Nut & Bolt Fastener Company, Pittsburgh, Pa.—Bartley fasteners and Bartley self-locking fasteners.

American Rail Joint Company, Niagara Falls, N. Y.—Rail joints.

American Railway Steel Tie Company, Harrisburg, Pa.—Section of track with its steel ties.

American Rolling Mill Company, Middletown, Ohio—American ingot iron corrugated culverts and other pure iron products, sheets, plates, boiler tubes, rivets, etc.

American Steel & Wire Company, Chicago, Ill.—Right-of-way fencing, gates, signal wire, rail bonds, tie-marking nails.

American Vulcanized Fiber Company, Wilmington, Del.—Original vulcanized fiber for rail joint insulation, steel tie insulation, mechanical use.

Armspear Manufacturing Company, New York, N. Y.—Railway signal lamps and lanterns.

Asphalt Ready Roofing Company, New York.—Protection brand roofing, Hudson brand asphalt felts.

Atlas Preservative Company of America, New York, N. Y.—Atlas "A" advertising matter.

Barrett Manufacturing Company, New York, N. Y.—Roofing, floor protection particularly adapted for wooden floors in repair shops and freight houses, bridge waterproofing, waterproofing and damp-proofing for masonry.

Beaver Dam Malleable Iron Company, Beaver Dam, Wis.—Tie plates and rail braces.

Blocki-Brennan Refining Company, Chicago, Ill.—Carboxide elastic metal preserver and some of the by-products.

Bowser & Company, Incorporated, S. F., Fort Wayne, Ind.—Oil storage systems, self-measuring pumps for handling oil, gasoline, varnishes, etc.

Brach Supply Company, L. S., New York, N. Y.—Railway signal and telephone lightning arresters, non-air-gap and vacuum types; highway crossing bells, automatic flagmen indications, Solderall and soldering appliances.

Bryant Zinc Company, Chicago, Ill., and New York, N. Y.—Locomotive type bells, highway crossing signals, relays, annunciators, channel pins and fiber conduit tools.

Buda Company, Chicago, Ill.—Railroad motor cars and velocipedes, track drills, rail grinders, switch stands, ratchet jacks, ball-bearing jacks, adjustable switch rods, solid manganese crossings, replacers, electric crossing gates and bumping posts.

Buyers' Index Company, Chicago, Ill.—Book "Railway Supply Index—Catalogue."

Cambria Steel Company, Johnstown, Pa.—Rails, 100 per cent splice bars, Morrison guard rails, "Coffin process" axles.

Canton Culvert Company, Canton, Ohio—Acme and Imperial corrugated No-Co-Ro metal culverts, Duro perforated corrugated No-Co-Ro metal railway drains.

Carey Company, Philip, Cincinnati, Ohio—Roofing, asbestos and magnesia products, insulating materials, waterproofing materials for concrete work and damp-proofing.

Carnegie Steel Company, Pittsburgh, Pa.—Steel switch ties, switches, frogs, Duquesne rail joints, steel wheels and sheet piling.

Carpenter & Company, George B., Chicago, Ill.—Cordage, cotton duck, tackle blocks, rubber goods, switch ropes, track tools.

Chicago Pneumatic Tool Company, Chicago, Ill.—Section motor cars, pneumatic and electric tools.

Chicago Railway Equipment Company, Chicago, Ill.—Brake beams, Monitor bolsters, Creco side bearings.

Chicago Steel Railway Tie Company, Chicago, Ill.—Steel railway tie.

Cleveland Frog & Crossing Company, Cleveland, Ohio.—"Hard Service" manganese frogs and crossings, improved spring rail clamps, interlocking switch appliances, etc.

Columbia Nut & Bolt Company, Inc., Bridgeport, Conn.—Columbia lock nuts, castle nuts.

Conley Frog & Switch Company, Memphis, Tenn.—Conley patent frogs, manganese frogs, railway track appliances.

Cook's Standard Tool Company, Kalamazoo, Mich.—Standard bonding drills, Standard track and car jacks, Climax track drills, Magic tool grinders, Magic chucks and high-speed bits.

Crane Company, Chicago, Ill.—Special valves for creosote, zinc, chloride, Crane tilt steam traps, special valves for railway and locomotive service, malleable and cast iron fittings.

D. & A. Post Mold Company, Three Rivers, Mich.—"D. & A." 10-post machine, anchor post molds, special line post molds, "D. & A." cement posts and sections, post reinforcement, tie wires.

Detroit Graphite Company, Detroit, Mich.—Paint for bridges, buildings, structural steel, etc.

Detroit Switch Lock Company, Detroit, Mich.—Self-locking switch stand.

Dietzgen Company, Eugene, Chicago, Ill.—A complete line of modern surveying instruments, leveling rods, ranging poles, tapes, rail profile machines and other supplies which are used by engineers in the office and in the field.

Dilworth, Porter & Company, Limited, Pittsburgh, Pa.—Railroad spikes and tie plates.

Dixon Crucible Company, Joseph, Jersey City, N. J.—Dixon's Silica-Graphite paint, graphite productions.

Drouvé Company, G., Bridgeport, Conn.—"Anti-Pluvius" puttyless skylights and the "Lovell" and "Straight-Push" sash operators.

Duluth Corrugating & Roofing Company, Duluth, Minn.—Corrugated galvanized iron culverts, portable steel tool house.

E. D. E. Company, Chicago, Ill.—Anti-creeper tie plate with lock device, passenger car ventilator made in both steel and wood.

Eastern Granite Roofing Company, New York, N. Y.—Granite roofing, "Evertite" roofing, "Tisbest" roofing, Palmoid roofing.

Economy Separable Switch Point Company, Incorporated, Louisville, Ky.—"Economy" separable switch points, positive rail anchors, positive rail anchor-tie plate combination, positive malleable tie plates, foot guard and claw bar.

Edison Storage Battery Company, Orange, N. J.—Edison storage batteries.

Electric Railway Journal, New York, N. Y.—Copies of the paper, souvenir issues, bound volumes, Electric Railway Dictionary.

Electric Storage Battery Company, Philadelphia, Pa.—"Chloride Accumulator" batteries and "Exide" batteries.

Enright-Frey Railway Equipment Company, New Orleans,

La.—Enright boltless rail joint, tie plate and anchor combined; rail anchor, guard rail brace, self-grinding gage cock.

Fairbanks, Morse & Company, Chicago, Ill.—Generating outfit, oil engine and pump, electric turntable tractor, telescopic standpipe, chain hoists, rail drills, jacks, motor cars, scales, cattle guards.

Federal Cement Tile Company, Chicago, Ill.—Roofing tile; special tile used on the Kansas City Union Station.

Federal Signal Company, Albany, N. Y.—Interlocking and signal apparatus.

Foster, Frank M., Columbus, Ohio—Foster interlocking switch stands.

Franklin Manufacturing Company, Franklin, Pa.—Asbestos corrugated roofing and siding; special journal box packing; wool and cotton waste.

Fruit Growers' Refrigerator & Power Company, Anna, Ill.—Reinforced concrete railroad culvert.

Galena Signal Oil Company, Franklin, Pa.—Perfection signal oil, Galena railway safety oil, ("B") Galena long-time burner oil.

Gearon, Sr., John, Chicago, Ill.—Composite steel railway tie.

General Electric Company, Schenectady, N. Y.—Gasoline electric generating sets, steam air and water flow meters, portable air compressors, mercury arc reflectors, motor generator sets, motors, transformers, lightning arresters, meters, switches, relays, rheostats and control panels.

General Railway Signal Company, Rochester, N. Y.—Electric-dynamic interlocking system, electric interlocker, model 4 switch machine, high semaphore signal, dwarf semaphore signal and electric interlocking accessories, mechanical interlocking and accessories, direct and alternating current block signal apparatus, line and track relays, switch and tower indicators, transformers, reactances, etc.

Greenlee Brothers & Company, Chicago, Ill.—Railroad tie machinery, automatic tie-adzing and boring machines, screw-spike driving machines, tie-doweling machines.

Grip Nut Company, Chicago, Ill.—Grip nuts, ladder fastenings and wrenches.

Handlan-Buck Manufacturing Company, St. Louis, Mo.—Handlan Special lanterns, McPartland rail clutches, track tools, metallic track and train flags.

Hart Steel Company, Elyria, Ohio—Tie plates and spikes.

Hayes Track Appliance Company, Richmond, Ind.—Hayes derails and attachments.

Hobart-Ailfree Company, Chicago, Ill.—Smyth derailers, Freeland derailers, Newton car replacers and Newton divided car replacers.

Hoeschen Manufacturing Company, Omaha, Neb.—Batteryless system of highway crossing bells, magneto-mechanical generators for crossing bells, signal devices.

Hubbard & Company, Pittsburgh, Pa.—Railroad track tools, shovels and scoops, bolts, nuts and washers, pole-line hardware.

Hunt Company, C. W., West New Brighton, New York, N. Y.—Models of automatic railway; conveyor; grab bucket, wheel and axle car with wheel and axle on it; curve, straight track and switch; shop car and pictures of coal-handling machinery.

Indianapolis Switch & Frog Company, Springfield, Ohio—Manganese frogs, crossings, switches, etc.; R-N-R manganese frogs and crossings and tests.

Inland Steel Company, Chicago, Ill.—Track bolts, spikes, rivets, concrete reinforcing bars, "Vismera" sheets.

Interlocking Nut & Bolt Company, Pittsburgh, Pa.—Clark nut lock.

International Automatic Signal Company, Chicago, Ill.—Electric cab signal with automatic stop.

International Steel Tie Company, Cleveland, Ohio—Composite railroad twin cross ties for light and heavy traffic.

Jerome Metallic Packing Company, Chicago, Ill.—Ruby portable steel houses.

Johns-Manville Company, H. W., New York, N. Y.—"Transite" asbestos smokejacks and ventilators, asbestos built-up and prepared roofing, wool felt roofing, corrugated asbestos roofing, "Transite" asbestos shingles, roof coatings, asbestos pipe coverings, packings, electrical materials, "J-M" sectional conduit, "J-M" fiber conduit for electrical wiring, and other building materials.

Joyce-Cridland Company, Dayton, Ohio—Railway jacks.

Kalamazoo Railway Supply Company, Kalamazoo, Mich.—Manufacturers of hand, push and velocipede cars, track drills, jacks, pressed steel wheels, track appliances.

Kellogg Switchboard & Supply Company, Chicago, Ill.—Railway telephone equipment, including train-dispatching sets, portable telephones, siding telephones and ordinary telephones for use on both steam and electric roads.

Kerite Insulated Wire and Cable Company, New York, N. Y.—Kerite insulated wires and cables.

Kernchen Ventilator Company, Chicago, Ill.—Ventilators for passenger coaches and buildings.

Keuffel & Esser Company, New York, N. Y.—Drawing materials, mathematical and surveying instruments, measuring tapes.

Lackawanna Steel Company, Buffalo, N. Y.—Rails, rail joints, structural and bridge material, reinforced concrete bars and track supplies.

Lebanon Engineering Company, Lebanon, Pa.—Forged steel rail brace tie plates, head support washers for screw spikes, and collet lock washers for track bolts.

Lehan Company, Chicago, Ill.—Waterproofed canvas for passenger cars, car roofing and insulating paper.

Lorain Steel Company, Johnstown, Pa.—Track material, frog, hard center and solid manganese crossings and switches, guard rail, etc.

Lufkin Rule Company, Saginaw, Mich.—Tapes and rules of all descriptions.

Lupton's Sons Company, David, Philadelphia, Pa.—Lupton steel sash for side walls, Pond continuous sash for monitor and sawtooth roofs, Pond operating device, special designs for lighting and ventilation of power houses and shop buildings.

Macleod & Company, Walter, Cincinnati, Ohio—Carbide lights, patent rail, patent spike.

Massey Company, C. F., Chicago, Ill.—Concrete oil-house; visual and audible highway crossing signal, concrete battery wells, concrete cable posts, mile posts, marker posts, lamp posts, battery chutes, junction boxes, trunking curbing, concrete pipe, telephone booths and watchmen's houses.

McCord & Company, Chicago.—McCord pinless lid journal box.

McFarlane Manufacturing Company, St. Paul, Minn.—Quick weight indicator to be used on scales.

McGraw Publishing Company, New York, N. Y.—Besides the exhibit of the Electric Railway Journal mentioned elsewhere, copies of the *Electrical World* and *Engineering Record*.

McKinnis Switch Lock Company, Chicago, Ill.—Switch point lock.

Milburn Company, Alexander, Baltimore, Md.—Portable acetylene construction, wrecking inspection and emergency lights, steam acetylene generators for locomotive headlights.

Modjeski & Angier, Chicago, Ill.—Laboratory equipment for complete chemical analysis and physical tests of cement and concrete.

Morden Frog and Crossing Works, Chicago, Ill.—Frogs, switches, switch stands, crossings, guard rails, guard-rail clamps, rail braces, etc., solid and built-up manganese steel.

Mudge & Company, Burton W., Chicago, Ill.—Mudge-Adams motor car.

Nachod Signal Company, Philadelphia, Pa.—Track plan connected with operative signals, high speed trolley contactors, miscellaneous signal parts.

National Carbon Company, Cleveland, Ohio—Columbia track batteries, dry batteries, multiple batteries.

National Lock Washer Company, Chicago, Ill., and Newark, N. J.—Nut locks and methods of testing.

National Malleable Castings Company, Chicago, Ill., and Toledo, Ohio—Track appliances.

National Surface Guard Company, Chicago, Ill.—Metal surface stock guards, ratchet track wrenches.

Nichols & Bro., Geo. P., Chicago, Ill.—Electric turntable tractor.

P. & M. Company, Chicago, Ill.—P. & M. rail anti-creeper, Crane guard rail retainer.

Payson Manufacturing Company, Chicago, Ill.—Mechanical devices for operating sash in series; ball-bearing steel wheels, railway velocipedes.

Pease Company, C. F., Chicago, Ill.—Automatic blue print machines, washing and drying machines and trimming tables, blue print paper coating machines.

Pennsylvania Steel Company-Maryland Steel Company, Philadelphia, Pa.—Crossings, frogs, switches, knuckle rails, switch stands, rails and joints.

Pittsburgh Steel Company, Pittsburgh, Pa.—Railroad fencing; barbed wire, plain wire; wire nails, etc.

Pocket List of Railroad Officials, New York, N. Y., and Chicago, Ill.—Pocket lists.

Q. & C. Company, New York, N. Y., and Chicago, Ill.—Bonzano joints, step joints, anti-creepers, guard rail clamps, rail benders, rail saws, rail-laying machine.

Rabok Manufacturing Company, St. Louis, Mo.—"Rabok" preservative paints.

Rail Joint Company, New York, N. Y.—Continuous, Weber and Wolhaupter rail joints.

Railroad Supply Company, Chicago, Ill.—Tie plates, derailers, highway crossing bells and electric railway signal appliances.

Railway Age Gazette, The Signal Engineer and American Engineer, New York, N. Y.—Copies of publications.

Ramapo Iron Works, Hillburn, N. Y.—Automatic safety switch stands, rolled steel shoulder switch slides, guard rail clamps, manganese reinforced switches and frogs.

Rich Tool Company, Chicago, Ill.—High power drill press, high speed twist drills, reamers, rivet sets, track bits.

Roadmasters' and Maintenance of Way Association, Sterling, Ill.—Literature.

Sandwich Electric Company, Sandwich, Ill.—Selective train dispatching apparatus, selective order boards, cordless jack boxes, cordless test panels.

Scherzer Rolling Lift Bridge Company, Chicago, Ill.—Models, literature, photographs, plans, etc., of Scherzer rolling lift bridges.

Sellers Manufacturing Company, Chicago, Ill.—Sellers anchor bottom tie plate.

Shane Steel Railway Tie & Appliance Company, Denver, Col.—Shane steel, railway tie and fastening.

Standard Asphalt & Rubber Company, Chicago, Ill.—"Sarco" waterproofing and asphalt floor materials.

Standard Underground Cable Company, Pittsburgh, Pa.—Various forms of wires and cables for all electrical purposes, junction boxes and terminals.

Stark Rolling Mill Company, Canton, Ohio—Black and galvanized "toncan" metal sheets and formed products.

Stotts Signal Company, Marion, Iowa—Automatic signal.

Strauss Bascule Bridge Company, Chicago, Ill.—Models of Strauss trunnion bascule bridges and Strauss direct lift bridge.

Templeton, Kenly & Company, Ltd., Chicago, Ill.—Simplex car and track jacks.

The National Roofing Company, Tonawanda, N. Y.—Security wide-weld gravel surface roofing.

The Railway and Engineering Review, Chicago, Ill.—Publications.

Trussed Concrete Steel Company, Detroit, Mich.—Kahn building products, reinforcing steel, Kahn trussed bars, rib bars, rib metal "Hy-Rib," column hooping, "Hy-Rib" and rib lath for roofs, sidings, partitions and ceilings, United steel sash for windows, side walls and monitors, United steel partitions and United steel doors.

Union Switch Signal Company, Swissvale, Pa.—Sales department. Interlocking and signaling apparatus.

United States Electric Company, New York, N. Y., and Chicago, Ill.—Gill selectors for railway telephone and telegraph, railway telephones and accessories, safety lanterns for railway trainmen, storage batteries.

United States Light & Heating Company, New York, N. Y.—All lines of pasted and Planté plates and cells. Several cells show sectional views. Cells for power, lighting, propulsion and ignition.

Universal Concrete Tie Company, New Orleans, La.—Reinforced concrete tie and rail-fastening device for steam and street railroads.

Universal Metallic Tie Company, Salt Lake City, Utah—Metal railway tie.

Verona Tool Works, Pittsburgh, Pa., and Chicago, Ill.—Track tools and nut locks.

Weir Frog Company, Cincinnati, Ohio—Railroad switches, switch stands, guard rail clamps, frogs.

Winan's Improved Patent Rail Joint Company, Portland, Ore.—Samples of rail joints.

Western Electric Company, Chicago, Ill.—Telephone train dispatching apparatus, Habirshaw wire, flaming arc lamps, W. E. interphones for railway shops, Sunbeam train lighting lamps, miscellaneous supplies.

Wharton, Jr., & Company, Wm., Inc., Philadelphia, Pa.—Switch points, guard rails with guard-rail clamps attached, manganese steel frogs, switch stands, manganese steel crossings, models, etc.

Young Continuous Rail & Boltless Angle Bars Company, The J. D., Oklahoma City, Okla.—Boltless angle bar.

COMMUNICATION

PSYCHOLOGICAL INVESTIGATION OF THE CAUSES OF ACCIDENTS

Wilmington & Philadelphia Traction Company.
Wilmington, Del., March 15, 1912.

To the Editors:

I have seen the discussion in your paper on the subject of "man failure" and its psychological investigation. I believe that there are, indeed, some shreds and tatters of a science which might be given the imposing name which now covers a lot of nonsense, but for the most part I believe that the traffic manager will be able to judge of his men a good deal better than Professor Munsterberg or any other of these people who give new names to familiar facts. That there should be such a thing as mental fatigue, mentioned in your editorial, back of these unexpected accidents, goes quite without saying. You and I are subject to it quite as much as the man on the platform. All of us are freshened up by an occasional holiday. No psychologist is necessary to establish that fact.

It is not probable that any test that can be devised will prophesy when a man is likely to make the sort of unexpected mistakes which are in question. It would be possible for the inspector or other similar officials who are in close personal touch with the motormen and conductors to determine whether or not they are in a normal and cheerful frame of mind. If not, it is always desirable that some inquiry should be made and some endeavor to remove the cause of controversy. In other words, we should try to get back in that way to something like the familiar relationship of the past between those who do the routine work and those who supervise them. It is not probable that anything will ever be discovered which will take the place of personal contact between human beings in the matter of inspiring the routine toiler to steady loyalty.

Through the same means, namely, that of intelligent, personal contact, we may hope to diminish the failure due to what you so aptly call mental fatigue.

Oscar T. Crosby, President.

ELECTRIFICATION OF THE ST. GOTTHARD RAILWAY

The Swiss state railway budget for 1912 states that the electrification of the St. Gotthard Railway is to begin shortly. The first piece of line to be electrified will be that between Erstfeld and Airolo, where the smoke nuisance is most keenly felt. The cost of electrification of the St. Gotthard line is estimated at £2,700,000, from which, however, the sum of, roughly, £220,000 must be deducted for new rolling stock necessitated not because of electrification but by an increase of traffic. The three new power stations to be built at Amsteg, Göschenen and on Ritom Lake, near Piotta, will cost £854,800; the necessary electric installations in the machinery houses, etc., another £305,200, while a considerable sum is allowed for contingencies. The calculations are made on the assumption that the traffic will be 30 per cent greater than that of 1907. With electric traction the speed of the trains would be increased over the entire length of the line, notably between Erstfeld and Göschenen and between Bodio and Airolo.

PENNSYLVANIA STORAGE BATTERY INTERURBAN LINE

The Ephrata & Lebanon Street Railway is completing a 22-mile line between Ephrata and Lebanon, Pa., which will be unique as the first interurban electric railway to be operated exclusively by storage battery cars. Edison-Beach battery cars, of a design entirely novel in storage battery car construction, will be used on this railway. The illustrations reproduced show the first of these cars as recently shipped by the manufacturer, the Federal Storage Battery Car Company, from its new plant at Silver Lake, N. J..

Combination Passenger and Baggage Storage Battery Car for the Ephrata & Lebanon Street Railway

This car is 35 ft. 1 in. long, 8 ft. 3 in. wide over all and weighs 31,000 lb. completely equipped. It contains a combination baggage-express-smoking compartment 14 ft. 11 in. long, which has two longitudinal benches seating five passengers each for smokers. As there is no partition between the smoking and baggage-express compartment, the smoking compartment seats and aisle space may be utilized for baggage and express parcels whenever desirable. At the end of one of these longitudinal seats there is installed a hot-water heater from which four rows of piping are extended throughout the car. This heater is guaranteed to maintain an even temperature of not less than 60 deg. inside the car in zero weather.

The car is equipped with double-end control, but only one end is provided with a platform. This platform is vestibuled with double-folding passenger doors at each entrance. The opposite end of the car is devoted to the baggage-express compartment with a 4-ft. sliding door at each side. The remaining half of the body contains eight cross seats and two longitudinal seats, all of rattan, with a combined capacity for twenty-four passengers. The interior trim of the car is of selected white ash veneered in quartered oak.

The roof is of the solid single-arch type as used in the first Edison-Beach car. It is made up of pressed-steel carlines covered with four sections of a composition of macerated spruce pressed into ⅜-in. board to the form of the roof, which is covered with white lead and heavy cotton duck. The ceiling has six ¼-in. sections of this composite board, also pressed to the arch form. The underframing is of two angles riveted together in Z-bar shapes with two longitudinal center I-beams and nine cross angle sills to which nailing strips for the floor are bolted, and a heavy channel end sill is riveted to the side and center sills. The body side and corner posts and the side framing are of selected white ash. The bottom framing is of long-leaf yellow pine.

The car is equipped with sixteen 10-cp tungsten lamps and two 20-cp tungsten lamps for dash headlights. All lamps are lighted from ten cells of the battery, which are charged in series with the power battery, but which are discharged on a separate circuit. The car is equipped with sand boxes at each corner and with hand brakes as well as storage air brakes. It also has 12-in. signal gongs and electric whistles which are operated from the battery circuit.

The body is mounted on Beach double trucks, made up of commercial shapes, double-pedestal coil springs and double elliptic body springs. A 12-hp motor, at each inside wheel of each truck, is suspended from the channel tie piece and motor support through suspension coil springs. The opposite side of the motor is supported by double split bearings with bronze bushings upon the stationary 3 11/16-in. axle; that is, the 30-in. steel-tired wheel rotates over a double train of 2-in. x 1¾-in. nickel-steel "Rollway" roller bearings. One train of bearings is located at each end of the wheel hub, which is 10 in. wide, these bearings revolving on a nickel-steel sleeve pressed rigid on the axle. This axle does not rotate, but is pinned to the pedestal spring box-guide. Thus the wheel rotates on the axle and independently of its mate, eliminating considerable friction loss which arises from the wheel-slip of the ordinary rigid wheel and axle arrangement. The car builder has found by experiment that a battery of at least 25 per cent greater capacity would be required if the wheels were not rotated upon the axle. This car is driven by means of standard pinions and gears attached to the wheel hubs.

The storage battery equipment consists of 190 cells Edison battery, A/6 type, for power and ten cells for lighting. The battery is guaranteed to maintain its original rated capacity for a period of four years, although six years' experience with these batteries in service is said to indicate an approximate useful life of seventeen years. Nevertheless, the manufacturer calculates that, even under the four-year guarantee, the car could readily cover 150 miles a day and be replaced by a new battery at the end of the guarantee period for a total cost not exceeding 1.8 cents per car mile. The only maintenance required with this

Passenger Compartment of Storage Battery Car

battery consists in the addition of water occasionally and the annual renewal of the electrolyte (21 per cent solution of water and potash) at a cost of 0.2 cent per car mile. The total annual cost, including water, potash and labor of battery attendance, is estimated to be well within $100 per car.

The present car is guaranteed to cover 80 miles on one charge of the battery, or 100 miles on one charge of the battery at the normal rate plus intermediate charges aggregating one hour at the high charging rate (five times the normal rate) which is permissible with this battery. The guaranteed speed is not less than 25 m.p.h. with full load on level track and 10 m.p.h. with full load on a 5.7 per cent grade. Furthermore, this car is guaranteed not to exceed an energy consumption of 2 kw-hours per car mile in regular service based on battery input. This energy figure is considered conservative inasmuch as a similarly equipped car operated at Montandon, Pa., has averaged 612 watts per car mile on the battery output basis and 918 watt-hours on the battery input basis. The latter car has also exceeded its mileage guarantees by making runs from 116 to 137 miles on one charge.

Plan of Combination Storage Battery Car

The following costs are reported on the Montandon car, which is operated by the Lewisburg, Milton & Watsontown Passenger Railway through lease arrangements with the Pennsylvania Railroad:

	Cents per Car Mile.
Power	3.33
Platform labor: Four men, 10 hours each at 17 cents per hour	5.67
Repairs, labor: One man, 3 hours a day	0.50
Repairs	0.93
Battery maintenance—electrolyte	0.20
Total	10.63

This car has replaced a steam locomotive and two coaches. It makes twenty-two trips a day where the steam equipment made two trips a day. It is reported to have operated with uniform success, even during heavy snowstorms and at temperatures 40 deg. below zero.

COOPER HEWITT CONVERTER FOR RAILWAY SERVICE

It is now announced that after experiments extending over eight years Dr. Peter Cooper Hewitt has succeeded in developing a mercury-vapor converter capable of delivering energy at a sufficiently high rate to operate railway cars or perform similar service. In fundamental principle of operation the latest type of converter does not differ from the earlier types which have been in service for many years for smaller outputs. However, the constructive features have been so altered as to overcome certain limitations in output encountered in the earlier equipments. The significance of the improvements will be appreciated from the fact that formerly about 50 amp was considered the limiting output, while with the newest equipment an output of more than 700 amp has already been reached, and no difficulty is anticipated in largely extending this limit.

In all of the earlier types use was made of a lower negative electrode of mercury held within a glass envelope, through the top portion of which were inserted two or more positive electrodes which in operation became active successively. Numerous mechanical and thermal causes, including expansion, leakage and temperature elevation phenomena, tended to keep the permissible output at from 30 amp to 50 amp. In the latest form use is made of a metallic envelope through the top of which the positive electrodes are inserted by way of porcelain tubes. The different parts are subjected to artificial cooling according to the amount of heat produced locally. That the limitations in output have been overcome is shown by the fact that one of the converters has operated at East Pittsburgh for a month at 200 kw without being re-exhausted, and at the end of this time was found to be in perfect operating condition.

This new form of converter can be employed not only where synchronous converters are now used, but also in certain other services where synchronous converters would prove disadvantageous; for example, in electric railway work, where it is thought power can be transmitted at high voltage as alternating current and transformed on the car or locomotive for use in direct-current motors at the desired voltage.

CHUCK FOR BORING BEARINGS.

The Columbia Machine Works & Malleable Iron Company, Brooklyn, N. Y., has again enlarged its variety of car maintenance appliances by the introduction of a chuck for boring motor bearings to absolute alignment and perfectly true with the outside bearing. This chuck, as shown in the accompanying views, is of the simplest possible construction. It is made of the best gray iron. The solid end is screwed on the lathe spindle like any lathe chuck, while the hinged portion, which is arranged to take bushings for various sizes of bearings, is clamped with a single bolt so that the bearings can be placed and removed quickly.

Chuck for Boring Bearings, Closed and Open

One chuck with bushings can be used on bearings for the following motors: Axle bearings, Westinghouse 12A-36-38B-49-101B-62-81-307-56-68-69 and GE-52-54-57-67-70-80-1000-1200-800; armature bearings, pinion end, Westinghouse 12A-38B-36-49-68-69-62-56-80 and GE-57-67-88-1000-1200-800; armature bearings, commutator end, Westinghouse 68-69-12A-38B-36-49 and GE-80-800-57. This chuck can be made for any style of bearing. The chuck shown is 10 in. in diameter and 12 in. long over all. It weighs 41½ lb. without the bushing.

Chuck for Boring Bearings, Showing Also Some of the Bushings for Which It Is Adapted

News of Electric Railways

Arbitration of Schedules Presents Paramount Question at Cleveland

A meeting of the directors of the Cleveland (Ohio) Railway was held on March 16, 1912. Four of the ten members were absent. Nothing was said in regard to the action of the City Council in refusing to increase the allowance for operating expenses, but it is probable that the board will ask for arbitration.

The statement of operation for February was received, but was not made public. It was known generally at the time, however, that an actual deficit of approximately $25,000 was shown in the statement, while on the basis of ordinance allowances a surplus of $7,000 appeared.

Attorney Charles Higley, acting for the company, and Dr. Elroy M. Avery, representing the men, have met almost every day since accepting the duties of arbitrators to settle the dispute in regard to the Superior Avenue schedule. Although they failed to agree upon a third member of the board, one was appointed later by Judge Day of the United States court.

It is said that the arbitration of this question has no status under the franchise ordinance. Street Railway Commissioner Witt told the men that no attention would be paid to the decision of the arbitrators when a committee of the Cleveland Federation of Labor visited him on March 13 and asked that the old schedule be restored. Mr. Witt declared that if the schedule fails one of the principal purposes of the Tayler franchise will be defeated. Judge Tayler, however, in formulating the franchise, was not committed to a 3-cent fare, but to as low a fare as was consistent with good service. It was pointed out to Mr. Witt that the franchise is too often construed incorrectly, and that it was not intended that there should be a flat committal to the lowest fare mentioned in the scale of rates.

On March 15 representatives of the railway men and the grievance committee of the Cleveland Federation of Labor discussed the advisability of appealing the subject of schedules direct to the City Council, but it was finally decided that this would not be advisable at present.

On March 19, 1912, A. B. Meldrum, pastor of Old Stone Church, Cleveland, was chosen president of the arbitral commission which will adjust the complaint of the men against the Superior Avenue schedule. Mr. Meldrum was named the third member by Federal Judge Day, who acted on request of Mr. Avery and Mr. Higley.

Communication from Pittsburgh Railways to Its Employees

The Pittsburgh (Pa.) Railways has addressed the committee which represents its employees as follows:

"The two-year agreement with the motormen and conductors will expire on April 30, 1912, and either party desiring a change is required to notify the other at least thirty days before that date.

"We hereby notify you that we are not satisfied with the cost of transportation for the last year, nor with the amount of co-operation and courtesy to passengers on the part of some of the train crews. The wages of motormen and conductors have gradually increased until the enormous sum of $2,400,000 was spent last year for this purpose.

"The lack of co-operation and care on the part of many of the crews has greatly increased our accidents and cost of repairs to cars, the amount of power necessary as well as the wear and tear on special work. It is true that most of the men have been faithful, efficient and careful, and to them all honor is due, but many others have apparently forgotten that a part of every cent saved to the company is after all for the crews themselves. The matter has simply reached the point where the number of nickels received will not meet the necessary expenditures. We cannot long pay out in wages what we do not have.

"Every car crew knows that almost without exception the new dwellings built within the last few years are in the outskirts of the city and that the number of long-haul passengers has greatly increased. It is not the actual fare that passengers pay so much as the distance they ride which settles the number of cars that must be run, the receipts per car mile and the expense incurred by the company.

"We do not see how we can increase the receipts very much until the sparsely settled districts build up and we have more short riders, so that the only thing left for us to do is to cut down expenses either by a reduction in the wages or by decreasing the number of trainmen employed. With this end in view we desire that you appoint a fair-minded committee having the interest of the whole body of trainmen at heart to discuss with us ways and means of accomplishing this necessary result—namely, a reduction in the wage expenses."

The men at present are paid from 23½ cents to 29½ cents an hour, according to the length of time they have been employed.

Progress on San Francisco's Municipal Railway

The following facts in regard to the progress of the work of reconstructing the Geary Street, Park & Ocean Railroad, San Francisco, Cal., as a municipal enterprise were given by Mayor Rolph, at the special meeting of the Board of Supervisors which he called on March 8, 1912:

The road will be in operation from Geary Street and Market Street to Thirty-third Avenue within ten months, possibly in seven months.

The present company will stop operations of cable cars within two months, possibly in one month.

Specifications for cars and construction of roadbed and track from Geary Street and Market Street to Thirty-third Avenue are ready.

More than $500,000 has been spent already on the project, and it is estimated that it will take $2,020,000 to complete the road to the ferry.

Specifications for power plant and carhouse will be ready within a month and the plant and the carhouse will be ready when the track is laid and the cars are delivered. Arrangements for purchase of power have already been made.

The plans and specifications under which bids for furnishing cars for the municipal railway are to be invited have been received from Bion J. Arnold and have been formally approved by the Board of Public Works. Bids are to be submitted on three types of car, all-steel, semi-steel and a standard wooden car. The specifications provide for a car 44 ft. long and 8½ ft. wide, seating twenty people in the closed central section and twelve in each of the two open-end sections. The seats in the closed sections are all to be set crosswise, as are those of one side of each open section, the other side to be occupied by a longitudinal seat. The bids are to provide for furnishing forty-three cars—also four complete additional sets of trucks.

Suggestions in Regard to Criticisms

Martin J. Insull, general manager of the Louisville & Southern Indiana Traction Company, Louisville & Northern Railway & Lighting Company and the United Gas & Electric Company, New Albany, Ind., has issued the following statement in regard to the method to be followed by patrons who have criticisms to offer or suggestions to make in regard to the service of the companies:

"The companies are here to give you the best service they can consistent with good business judgment. Their management and their employees are pleased indeed to receive just criticism and reasonable suggestions that may lead to the improvement of their service and to a continuance of their pleasant relations with their patrons in particular and the communities they serve in general. They, however, feel that they must decidedly take the position of refusing to notice any criticisms or suggestions in the form of anonymous letters. This class of communication is unfair and contrary to the spirit of American institutions. The writer of such assumes that there is only one side to the case under discussion, which in many instances may be very far from

true. It is contrary to the doctrine of the 'square deal,' because, if the writer is misinformed or his conclusions wrong, owing to his unfamiliarity with all the facts bearing on the particular situation, he does not give the companies an opportunity to set him right. On the other hand, if he is right he should certainly have no objection to letting the companies know who is helping them to better their service and to improve their relations with the public.

"If you have suggestions or criticisms to make, first think them over from all the points of view at your disposal. If, after doing so, you decide you are right, go ahead and write us over your signature, as man should write to man, and you will be answered in the same courteous spirit. Such mutual consideration must ultimately redound to the advantage of not only yourself, but also to that of the communities in which you live and to the companies which are here to serve them."

Fenders in New Orleans.—On March 22 the City Council of New Orleans was to meet to consider the adoption of a fender for cars of the New Orleans Railway & Light Company. The company has declared its willingness to cooperate with the city and aid it by conducting tests to determine the relative efficiency of different types of fenders applicable to use in New Orleans.

Modification of Cleveland Subway Grant Requested.—W. R. Hopkins, promoter of the proposed subways at Cleveland, Ohio, has asked the City Council indirectly to amend the franchise granted the company. Unless these changes are made he said he doubted whether work could be begun in June, 1912, as provided in the franchise. Mr. Hopkins wants the provision regarding free territory modified so that it will apply only to streets where the company will have sole rights. He also desires that the provision for beginning an amortization fund shall be changed so that the fund will not have to be started until all the lines are completed. He urges that the company be given control of all the cars operated in the tunnels which it constructs.

Briefs Filed in Subway Test Case in New York.—The Public Service Commission for the First District of New York, through its counsel, George S. Coleman, has filed briefs in the cases of John R. Ryon, the Admiral Realty Company and John J. Hopper against the commission and the city of New York, asking for an injunction to prevent the commission from making an operating contract for new subways with the Interborough Rapid Transit Company and the Brooklyn Rapid Transit Company containing provisions for preferential payments out of earnings to said companies. The briefs were filed with Supreme Court Justice Blackmar in Brooklyn, who, it is expected, will render a decision soon. Owing to the importance of the case, whatever the decision may be it probably will be taken to the Court of Appeals. It is hoped that a decision by that court may be reached before the summer vacation.

Progress of Negotiations for a New Franchise in Racine.—The Milwaukee Electric Railway & Light Company, Milwaukee, Wis., which is negotiating for a new franchise in Racine, has agreed to grant a 5-cent fare to the city limits as extended, to put conductors on all cars as soon as the proposed extensions are in operation, to lay a double track on Kinzie Avenue from the bridge to Graham Street, and to put six new pay-as-you-enter cars in service immediately. The company has, however, refused the request of the city authorities to agree to double-track its entire system within ten years. R. B. Stearns, assistant general manager of the company in charge of the railway department, is quoted as follows: "Under no condition can this company accept a franchise that requires a double-track system. If the Council is to insist upon that provision, we prefer to retire and withdraw the proposed franchise. The double-track feature makes it absolutely prohibitive, and if it is insisted upon we want to drop the whole thing. You may get some idea of what it means to us when I tell you that it costs $55,000 to build a mile of track with the paving added."

Estimate of Probable Earnings of New Rapid Transit Route in New York.—E. G. Connette, transportation engineer of the Public Service Commission of the First District of New York, has submitted to the commission an estimate of the probable earnings and expenses of the proposed Broadway-Lexington subway in the borough of Manhattan, if operated by the municipality. Mr. Connette finds that there would be a deficit in such operation for three or four years after the subway opened, but his most serious objection to municipal operation is that it would introduce another system of rapid transit, whereas, he says, "if a reasonable contract could be made with one of the companies operating rapid transit lines to operate the new lines in conjunction with the present system at a uniform fare of 5 cents with the privilege of transfer, it would provide a substantial added convenience to the public." Mr. Connette says that the only real element of increase in operating cost would be in labor, the hours of which are limited for city employees. He adds that if an annual depreciation charge is made the new subway may not show a profit until the fifth year, but that it is fair to state that the Broadway-Lexington line will have a greater capacity than the existing subway, as it is designed for cars 10 ft. wide, while the cars of the existing subway are only 9 ft. wide.

Differences Between City and Company Adjusted in Atlanta.—The special committee of the City Council and the officials of the Georgia Railway & Electric Company and the Georgia Railway & Power Company, Atlanta, Ga., have reached an agreement by which the differences between them referred to in the ELECTRIC RAILWAY JOURNAL of March 16, 1912, page 442, will be settled. The officers of the companies were assured by a sub-committee that at least twenty-six members of the Council would ratify the agreement. This makes it quite certain that the agreement will be approved by Council, and as the Mayor was a member of the sub-committee he will doubtless sanction the action of the Council. The following conditions are included in the agreement: Rates for electric lights reduced from 9 cents to 7 cents per kw-hr., net; rates for electric power reduced from 5.40 cents per kw-hr. to 4.50 cents per kw-hr., net; minimum for electric lights $1 instead of $2; minimum for electric power 50 cents instead of $1 per hp; company to pay for 16 ft. instead of 11 ft. of street paving where there are double tracks, and for 11 ft. where there are single tracks, as at present; string wires and install electric power 200 ft. for any customer without charge; protect the city's water supply at the river; the city to consent to the merger of the Georgia Railway & Electric Company and the Georgia Railway & Power Company; the city to withdraw petition from the Railroad Commission for an investigation of electric light and power rates; the Council not to persist in its campaign for lower street car fares.

LEGISLATION AFFECTING ELECTRIC RAILWAYS

KENTUCKY

The Kentucky Legislature has adjourned. A bill has been passed prohibiting the giving away of street railway transfers. A speaker in the House stated that people were known to be making a business of obtaining transfers and disposing of them to passengers who would ordinarily pay full fare to ride on intersecting lines to which the transfers applied. The bill makes it a misdemeanor to give away or sell transfers. The measure is now before the Governor. A bill was defeated to provide that street railways in cities of the fourth class should pay the cost of construction and reconstruction of a portion of the streets occupied by their tracks. The measure was passed by the House, but was defeated in the Senate.

NEW YORK

The Assembly has defeated the Goldberg bill which was so drawn as to provide for free transfers on the connecting surface railways in the borough of Manhattan, New York City. On March 18 Senator Wagner introduced a bill to amend the Rapid Transit act so as to enable the city of New York to enter into a contract with the Interborough Rapid Transit Company and the Brooklyn Rapid Transit Company for the construction of the subway in accordance with the tentative agreements which have been made. The bill was referred to the cities committee, which will give a hearing on March 26. The Senate has refused to confirm the nomination by Governor Dix of Herbert P. Bissell, East Aurora, as a member of the Public Service Commission of the Second District.

Financial and Corporate

Stock and Money Markets

March 20, 1912.

Transactions on the New York Stock Exchange to-day were larger than on any other day in the month, and the price of practically every issue on the security list was carried up with the buying movement, which remained in full force up to the close of the day and left net gains of between one and three points. Copper prices, on a great wave of buying, rose to 15 cents a pound. Quotations for loans to-day were: Call, 2¼@2½ per cent; sixty days, 3@3¼ per cent; ninety days, 3½@3¾ per cent.

In the Philadelphia market only narrow fluctuations in prices were recorded during the greater part of the session. Electric Storage Battery stock was an exception, however, and reached 56.

In the Chicago market almost the entire list ruled strong, with advances of a point in several issues. Commonwealth Edison closed a point lower.

In the Boston market substantial gains were recorded in nearly all prominent stocks, railroad, industrial and copper shares being included.

In Baltimore the market was quiet and prices steady.

Quotations of traction and manufacturing securities as compared with last week follow:

	Mar. 13.	Mar. 20.
American Brake Shoe & Foundry (common)	a95¾	a95¼
American Brake Shoe & Foundry (preferred)	a134½	a132¾
American Cities Company (common)	29¾	*29¾
American Cities Company (preferred)	80½	a80½
American Light & Traction Company (common)	302	*302
American Light & Traction Company (preferred)	109	a109
American Railways Company	a44¾	a44¼
Aurora, Elgin & Chicago Railroad (common)	a44	a43
Aurora, Elgin & Chicago Railroad (preferred)	a87¼	a88
Boston Elevated Railway	a133	a132½
Boston Suburban Electric Companies (common)	a15	a15
Boston Suburban Electric Companies (preferred)	a77½	a77½
Boston & Worcester Electric Companies (common)	a13	a13
Boston & Worcester Electric Companies (preferred)	a56	a56
Brooklyn Rapid Transit Company	79⅞	81⅝
Capital Traction Company, Washington	a126½	126½
Chicago City Railway	a190	a190
Chicago Elevated Railways (common)	a35	a33
Chicago Elevated Railways (preferred)	a94	a94
Chicago Railways, ptcptg., ctf. 1	a100	a100
Chicago Railways, ptcptg., ctf. 2	a34	a34
Chicago Railways, ptcptg., ctf. 3	a95⅛	a9½
Chicago Railways, ptcptg., ctf. 4	a5½	a5¾
Cincinnati Street Railway	a131	a131
Cleveland Railway	a105½	a104½
Cleveland, Southwestern & Columbus Ry. (common)	*4¾	*4¾
Cleveland, Southwestern & Columbus Ry. (preferred)	*33	*33
Columbus Railway & Light Company	a55	a55
Columbus Railway (common)	a80	a80
Columbus Railway (preferred)	a92½	a94
Dayton Street Railway (common)	a25	a25
Dayton Street Railway (preferred)	a100	a100
Denver & Northwestern Railway	135	*135
Detroit United Railway	a70	a70
General Electric Company	a165	a166¼
Georgia Railway & Electric Company (common)	a166	a172
Georgia Railway & Electric Company (preferred)	a87¼	a86
Interborough Metropolitan Company (common)	18¼	a19⅛
Interborough Metropolitan Company (preferred)	57⅝	a59¼
International Traction Company, 4% bonds, rcts	*75	*75
Indiana Union Traction Company	*10½	*10½
Kansas City Railway & Light Company (common)	a20	a20
Kansas City Railway & Light Company (preferred)	a51½	a50
Lake Shore Electric Railway (common)	6½	*6½
Lake Shore Electric Railway (1st preferred)	90	*90
Lake Shore Electric Railway (2d preferred)	22½	*22½
Manhattan Railway	138¾	a138
Massachusetts Electric Companies (common)	a21½	a22½
Massachusetts Electric Companies (preferred)	96¾	a96¾
Milwaukee Electric Railway & Light (preferred)	105	105
Norfolk Railway & Light Company	27	27
North American Company	a80⅛	a80⅛
Northern Ohio Light & Traction Company (common)	a58	a57½
Northern Ohio Light & Traction Company (preferred)	a101	a100
Philadelphia Company, Pittsburgh (preferred)	a55⅛	a54½
Philadelphia Company, Pittsburgh (common)	a44½	a44
Philadelphia Rapid Transit Company	a23¼	23⅛
Portland Railway, Light & Power Company	71½	*71½
Public Service Corporation	a108	a112
Seattle Electric Company (common)	*118	*118
Seattle Electric Company (preferred)	*103	*103
Third Avenue Railway, New York	43⅜	43½
Toledo Railways & Light Company	33½	33½
Twin City Rapid Transit Co., Minneapolis (common)	a106½	a106
United Rys. & Electric Company (Baltimore)	20½	*20½
United Rys. Inv. Co. (common)	35¼	35½
United Rys. Inv. Co. (preferred)	63½	63
Virginia Railway & Power Company (common)	a47	a47
Virginia Railway & Power Company (preferred)	a88½	a88½
Washington Ry. & Electric Company (common)	a74⅞	*74⅞
Washington Ry. & Electric Company (preferred)	a92½	*92½
West End Street Railway, Boston (common)	a88	a88½
West End Street Railway, Boston (preferred)	a103½	a103½
Westinghouse Elec. & Mfg. Co.	a71	a71¼
Westinghouse Elec. & Mfg. Co. (1st preferred)	a122	a122

*Last sale. a Asked.

ANNUAL REPORTS

Washington Railway & Electric Company

The income account of the Washington (D. C.) Railway & Electric Company for the year ended Dec. 31, 1911, compares with the two preceding years as follows:

	1909	1910	1911
Gross earnings from operation	$4,080,063.99	$4,123,559.66	$4,336,519.44
Operating expenses	2,110,578.58	2,151,828.63	2,190,611.03
Net earnings from operation	$1,969,485.41	$1,971,731.03	$2,145,908.41
Miscellaneous income	10,602.35	23,310.57	16,151.97
Gross income less operating expenses	$1,980,087.76	$1,995,041.60	$2,162,060.38
Fixed charges:			
Taxes	$200,027.78	$210,780.41	$219,592.82
Interest	1,030,265.14	1,056,438.88	1,077,666.67
Miscellaneous	.....	13,178.94	13,893.00
Total	$1,230,292.92	$1,280,398.23	$1,311,152.49
Surplus	749,794.84	714,643.37	850,907.89
Percentage of operating expenses, including taxes, to gross earnings	56.64	57.27	55.57

A statement of the profit and loss account of the Washington Railway & Electric Company for the last year is as follows: Surplus Dec. 31, 1910, $943,339; add net income year ended Dec. 31, 1911, $646,230; total, $1,589,569; less depreciation in equipment retired or sold during year, $56,318; removal of abandoned tracks, $6,065; charged off account Glen Echo Park, $7,425; dividend on preferred stock, $425,000; dividend on common stock, $130,000; total, $624,808; surplus Dec. 31, 1911, $964,761. The net income of the whole system for the year ended Dec. 31, 1911, as shown above, was $850,907, of which $204,677 was applied directly by the subsidiary companies without passing through the profit and loss account of the Washington Railway & Electric Company.

Clarence P. King, the president, says in the report in part:

"The net charge made during the year by the railway companies to construction account was only $4,824. Charges to this account included items aggregating $130,516. This was reduced by credits from the retirement of cars, abandonment of tracks and other similar items amounting to $125,692, thereby reducing the net charge of the railway companies to construction account to $4,824. The expenditures by the Potomac Electric Power Company for additions, extensions and new equipment amounted to $423,151. The Potomac Electric Power Company issued during the year $450,000 additional of consolidated mortgage 5 per cent bonds, of which $370,000 were sold and the proceeds used for the purposes of the company.

"No change was made during the year in the securities heretofore set aside as a depreciation reserve.

"The year's requirements for the sinking fund of the Potomac Electric Power Company amounted to $77,300. This sum was deducted from surplus earnings and invested in consolidated mortgage 4 per cent bonds of the Washington Railway & Electric Company. The amount invested in the sinking fund is now $234,153.

"The railway companies carried 81,309,540 passengers during the year, of which 20,995,292 were free transfers. The average fare was 4.316 cents per day passenger carried. The average fare was 3.164 cents per passenger carried, including transfers.

"On Dec. 31, 1911, the Potomac Electric Power Company had 16,212 customers, an increase for the year of 2,721.

"Operating expenses include renewal of rails at an aggregate cost of $110,638, covering 5.87 miles of single track.

"The relief association, organized in 1900, composed exclusively of employees of the Washington Railway & Electric Company and its subsidiary companies, has a membership of 1,156. Since its organization it has disbursed sick and death benefits to the amount of $88,499 and has an accumulated surplus, well invested, of $40,398.

"A pension system, providing for aged and injured employees, was put into effect on Jan. 1, 1907. Under the rules established by the pension board twelve employees have received pensions.

"The Potomac Electric Power Company has enlarged its substations, installed additional conduits, underground cables, overhead lines, etc., thus providing for the municipal and public demands for electric lighting and power.

"On April 1, 1911, the Washington & Rockville Railway went into the hands of a receiver and since that date has been operated by George Weems Williams, receiver.

"An order has been placed for fifty fourteen-bench open cars to be delivered in April and May. Other extensive improvements are in contemplation.

"Car schedules are being changed from time to time to meet best the demands of the traffic."

Winnipeg Electric Railway

Earnings of the Winnipeg (Man.) Electric Railway compare for three years as follows:

Year Ended Dec. 31.	1911	1910	1909
Gross receipts	$3,829,749	$3,284,342	$2,623,731
Increase 1911 over 1910, 16.61 per cent	545,407		
Operating expenses	1,900,967	1,654,833	1,320,665
Increase 1911 over 1910, 14.87 per cent	246,134		
Operating expenses—per cent of earnings	49.64	50.39	50.34
Net earnings	$1,928,782	$1,629,509	$1,303,066
Increase 1911 over 1910, 18.36 per cent	299,273		
Net income, per cent of capital	18.51	15.58	14.39
Passengers carried	40,281,245	31,369,421	26,382,773
Increase 1911 over 1910	8,911,824		
Transfers	10,012,048	8,003,038	8,925,849
Railway earnings per capita	$10.46	$10.02	$10.03

Sir William Mackenzie, the president, says in part:

"All the properties of the company have been efficiently maintained.

"In accordance with the plan of extensions adopted at the last annual meeting, the following improvements and additions to the company's equipment and system have been made in the various departments:

"Track and roadbed—10.842 miles of track was laid.

"Rolling stock—Thirty large double-truck closed motor cars with wide vestibules, equipped with air brakes and all other modern appliances to insure safety of passengers and operators, were constructed in the company's Winnipeg shops and put in service, together with two double-truck open cars of latest modern design and one motor flat car for construction purposes and one trail flat car for construction purposes.

"Electric lighting and power distribution system—Eleven hundred and thirty-four new poles were erected and 216,424 lb. of wire with 189 transformers put up, in extension of the company's light and power distribution system.

"Gas distribution system—New gas mains 50,358 ft. in length were laid.

"Construction—A new auxiliary steam plant of 12,000 hp capacity was constructed during the year and is now in operation, which gives the company a capacity of 20,000 hp of auxiliary steam plant to protect the company and its customers from any serious break-down at the hydraulic works."

Detroit United Railway

A statement of operations of the Detroit (Mich.) United Railway System for the year ended Dec. 31, 1911, with a comparison, follows:

	1911.	1910.
Passenger earnings	$9,615,118	$8,777,681
Express earnings	586,995	519,620
Mail earnings	11,906	11,831
Special car earnings	39,114	36,087
Gross earnings from operation	$10,253,133	$9,345,219
Operating expenses	6,580,041	5,981,065
Net earnings from operation	$3,673,092	$3,364,154
Income from other sources	178,812	152,768
Gross income less operating expenses	$3,851,904	$3,516,922
Interest on funded and floating debt, and taxes	$2,123,397	$2,030,622
Credited to depreciation reserve	400,000	400,000
Credited to contingent liability reserve		100,000
Dividends	625,000	
Total deductions	$3,148,397	$2,530,622
Net income to surplus	703,507	986,300

There has been expended on capital account during the year, and charged out under the head of "additions and betterments," in accordance with the classification of expenditures for road and equipment as prescribed by the State and Interstate Commerce Commissions, as follows: Road, $691,384; equipment, $717,139; general expenditures, miscellaneous, $42,131; total, $1,450,654; credit, sale of cars, etc., $2,775; total, $1,447,879; Rapid Railway System, road, $144,548; Detroit, Monroe & Toledo Short Line Railway, road, $74,003; Detroit, Jackson & Chicago Railway, road, $149,700; Sandwich, Windsor & Amherstburg Railway, extension of lighting plant, building of new track and purchase of six new cars, $45,056.

Provisions have been made to pay the balance of this company's collateral trust notes amounting to $1,500,000 and maturing on Jan. 1, 1912. These notes are to be paid out of the proceeds of the sale of stockholders of Detroit United Railway 4½ per cent bonds.

President J. C. Hutchins calls attention to the fact that during the year the company made liberal expenditures for the maintenance of its tracks, rolling stock and other properties. On Jan. 1, 1911, the depreciation reserve stood credited with $1,379,627. Depreciation of $400,000 has been charged against the income for the year, of which $250,000 has been applied as a direct reduction of investment account because of cars replaced, and the balance of $150,000 added to the reserve.

Traffic statistics for the year on the Detroit United Railway, comprising the local lines in Detroit and certain interurban divisions, and on the system as a whole were as follows:

	Detroit.	Total.
Revenue passengers	168,088,543	182,612,786
Transfer passengers	52,797,831	53,652,879
Employee passengers	6,508,653	6,983,988
Total passengers	227,395,027	243,249,653
Receipts revenue passenger	$0.0468	$0.0526
Receipts per passenger	0.0346	0.0395
Car mileage	31,570,639	38,280,233
Earnings per car mile	$0.2588	$0.2678
Expenses per car mile	0.1654	0.1718
Net earnings per car mile	0.0934	0.0960

Indianapolis, Crawfordsville & Western Traction Company, Crawfordsville, Ind.—The sale of the property of the Indianapolis, Crawfordsville & Western Traction Company under foreclosure has been fixed by the court for April 6, 1912.

Miami & Erie Canal Transportation Company, Cincinnati, Ohio.—By ordering the Circuit Court of Franklin County to sustain the demurrers of the State to the answers of the Miami & Erie Canal Transportation Company, the Ohio Supreme Court has practically ended the existence of the company, it is claimed. The demurrers were sweeping in their nature. The company was organized in 1898 after the Legislature had authorized the company to use the bank of the canal between Cincinnati and Toledo for tracks for motors that were to draw canal boats. In 1905 the Attorney General began ouster proceedings, and this is the case that has just been decided.

Monongahela Traction Company, Fairmont, W. Va.—The Monongahela Traction Company has been organized under the laws of West Virginia with an authorized bond issue of $15,000,000 and an authorized capital stock of $7,500,000 to take over the property of the Fairmont & Clarksburg Traction Company, the Fairmont & Northern Traction Company and the Clarksburg & Western Electric Railway. A special meeting of stockholders of the Fairmont & Clarksburg Traction Company will be held on May 16, 1912, to ratify the action of the directors on the proposed consolidation. The capital stock of the Monongahela Traction Company will consist of $2,500,000 of 5 per cent cumulative preferred stock and $5,000,000 of common stock. The holders of the preferred stock of the Fairmont & Clarksburg Traction Company will receive share for share in the new company and holders of the common stock will receive two shares of common of the new company for one share of their present holdings. The officers of the new company follow: S. L. Watson, president; J. H. Wheelwright, vice-president; Walter Miller, secretary and treasurer; J. O. Watson, general manager; S. L. Watson, Clarence C. W. Watson, A. B. Fleming, C. L. Shaver, J. E. Watson, Walter Miller, George T. Watson and James O. Watson, Fairmont; S. C. Denham, Clarksburg; Van Lear Black and J. H. Wheelwright, Baltimore, directors.

New York (N. Y.) Railways.—A notice to the following effect has been addressed to the holders of certificates of deposit of the United States Mortgage & Trust Company, New York, N. Y., as depositary under an agreement dated

April 9, 1909, between the assenting holders of the three-year 5 per cent collateral notes of the Central Crosstown Railroad dated May 1, 1906: That the committee named in the agreement has approved and assented to the provisions relating to the collateral notes of the reorganization plan of the Metropolitan Street Railway dated Nov. 29, 1911, and that said noteholders' committee has accordingly entered into an agreement for the sale of said collateral notes, with all interest claims pertaining thereto, to the joint committee in the Metropolitan Street Railway plan provided for, or its assigns, upon the following terms and conditions: For each $5,000 face amount of collateral notes, with interest, the said joint committee shall pay $754.65 face amount in thirty-year first real estate and refunding mortgage 4 per cent gold bonds of the New York Railways dated Jan. 1, 1912, and $3,545.30 face amount in thirty-year adjustment mortgage 5 per cent income gold bonds of the New York Railways dated Jan. 1, 1912. Said agreement of purchase is upon condition that not less than 95 per cent face amount of notes, with interest claims, shall be delivered to the Guaranty Trust Company on or before April 30 for the account of said joint committee.

Northern Texas Traction Company, Fort Worth, Tex.—The Northern Texas Traction Company has filed with the Secretary of State an amendment to the charter of the company, increasing its capital stock from $4,500,000 to $6,000,000.

Pacific Gas & Electric Company, San Francisco, Cal.—Samuel Insull, president of the Commonwealth Edison Company, Chicago, Ill., and H. M. Byllesby, of H. M. Byllesby & Company, Chicago, Ill., as the heads of a syndicate of Chicago capitalists, have concluded the details of the purchase of 40,000 shares, or $4,000,000, of the common stock of the Pacific Gas & Electric Company, at a price understood to have been around 62½. The stock was sold by the estate of N. W. Halsey.

St. Albans (Vt.) Street Railway.—By order of the District Court of the United States for the District of Vermont the property of the St. Albans Street Railway will be sold under foreclosure at St. Albans, on April 10, 1912. The upset price has been fixed at $50,000.

United Railways, St. Louis, Mo.—Circuit Judge W. M. Kinsey has denied the application of J. Brooks Johnson for a receiver for the St. Louis Transit Company. Mr. Johnson asked for a receiver in his efforts to collect on judgments amounting to $24,517 which he bought from creditors of the St. Louis Transit Company. Judge Kinsey overruled a demurrer to Mr. Johnson's motion that the plans of the United Railways by which it took over the consolidated street railways in St. Louis should be investigated.

West Penn Traction Company, Pittsburgh, Pa.—The stockholders of the West Penn Traction Company will vote on April 24, 1912, on a proposition of the American Water Works & Guaranty Company to incorporate a new company, to be known as the West Penn Traction & Water Power Company, with $27,000,000 capital stock, divided into $6,500,000 of 6 per cent cumulative preferred stock and $20,500,000 of common stock. The new company is to deliver to the Water Works & Guaranty Company its full issue of stock in exchange for the entire common capital stock of the West Penn Traction Company, amounting to $6,500,000, and in addition $500,000 of common stock of the Cheat River Hydroelectric Company, provided that for each share of common stock of the West Penn Traction Company not delivered by the Water Works & Guaranty Company there shall be deducted from the stock to be issued to it one share of common and one share of preferred stock of the new company, which shall remain unissued in the treasury of the latter company. The holders of the common stock of the West Penn Traction Company are to receive in exchange for the surrender of their stock one share of the preferred and one share of the common stock of the new company, which is to lease the property of the West Penn Traction Company and to pay operating expenses and maintenance of the properties of the West Penn Traction Company and all taxes, interest, rentals, etc.; also dividends on the 6 per cent cumulative preferred stock of the West Penn Traction Company and dividends upon its common stock at 6 per cent per annum, beginning on June 15, 1912. When sufficient stockholders approve the proposition the American Water Works & Guaranty Company will deliver to the new company $1,500,000 of common stock of the Cheat River Hydroelectric Company, being three-fourths of the entire amount. The proposition, if accepted, is to take effect as of Jan. 1, 1912. The depositaries for the common stock of the West Penn Traction Company are the Louisville Trust Company, Louisville, Ky., and the Colonial Trust Company, Pittsburgh, Pa.

Dividends Declared

Augusta-Aiken Railway & Electric Company, Augusta, Ga., quarterly, 1½ per cent, preferred.

Capital Traction Company, Washington, D. C., quarterly, 1½ per cent.

Central Pennsylvania Traction Company, Harrisburg, Pa., 3 per cent.

Chattanooga Railway & Light Company, Chattanooga, Tenn., quarterly, 1¾ per cent, preferred.

Frankford & Southwark Passenger Railway, Philadelphia, Pa., quarterly, $4.50.

Germantown Passenger Railway, Philadelphia, Pa., quarterly, $1.31¼.

Northern Ohio Traction & Light Company, Akron, Ohio, quarterly, 1½ per cent., preferred.

Syracuse (N. Y.) Rapid Transit Railway, quarterly, 1½ per cent, preferred; quarterly, 1 per cent, common.

Toronto (Ont.) Railway, quarterly, 2 per cent.

Tri-City Railway & Light Company, Davenport, Ia., quarterly, 1½ per cent, preferred.

Union Traction Company of Indiana, Anderson, Ind., 2½ per cent, preferred.

Union Utilities Company, Morgantown, W. Va., 3½ per cent, preferred; quarterly, ¾ of 1 per cent, common.

United Traction & Electric Company, Providence, R. I., quarterly, 1¼ per cent.

Washington Water Power Company, Spokane, Wash., quarterly, 2 per cent.

West India Electric Company, Ltd., Kingston, Jamaica, quarterly, 1¼ per cent.

ELECTRIC RAILWAY MONTHLY EARNINGS

AMERICAN RAILWAYS, PHILADELPHIA, PA.

Period.			Gross Earnings.	Operating Expenses.	Net Earnings.	Fixed Charges.	Net Surplus.
1 m.,	Feb.	'12	$350,535	.....	.....	.....	.....
1 "	"	'11	321,600	.....	.....	.....	.....
8 "	"	'11	[illegible]				
8 "	"	'10	3,008,652	.....	.....	.....	.....
ATLANTIC SHORE RAILWAY							
1 m.,	Jan.	'12	$20,120	$20,231	$111	.....	.....
1 "	"	'11	17,592	16,710	882	.....	.....
CLEVELAND, SOUTHWESTERN & COLUMBUS RAILWAY							
1 m.,	Jan.	'12	$79,570	$52,798	$26,773	$26,773	$30,184
1 "	"	'11	80,805	48,268	32,537	32,537	29,710
DALLAS (TEX.) ELECTRIC CORPORATION							
1 m.,	Jan.	'12	$135,170	$86,242	$48,929	$19,614	$29,315
1 "	"	'11	135,180	84,143	51,037	21,277	29,760
EL PASO (TEX.) ELECTRIC COMPANY							
1 m.,	Jan.	'12	$69,775	$35,619	$34,156	$7,156	$27,001
1 "	"	'11	61,769	35,532	26,237	6,676	19,560
GALVESTON ELECTRIC COMPANY							
1 m.,	Jan.	'12	$35,105	$22,144	$12,962	$8,754	$5,207
1 "	"	'11	28,533	18,693	9,841	7,048	2,793
HUDSON & MANHATTAN RAILROAD							
1 m.,	Jan.	'12	$455,209	$201,319	$253,890	$245,119	$8,770
1 "	Dec.	'11	452,364	185,000	266,363	243,634	22,729
ILLINOIS TRACTION COMPANY							
1 m.,	Jan.	'12	$616,705	$358,961	$257,743	.....	.....
1 "	"	'11	573,972	347,909	226,062	.....	.....
PHILADELPHIA RAPID TRANSIT COMPANY							
1 m.,	Jan.	'12	$1,725,408	$1,124,536	$600,873	$739,442	†$138,569
1 "	"	'11	1,599,464	1,031,352	568,112	733,346	†165,234
8 "	"	'11	14,878,289	9,145,835	5,732,454	5,910,088	†177,634
8 "	"	'10	14,048,944	8,643,909	5,405,036	5,851,592	†446,557
PUGET SOUND ELECTRIC RAILWAY							
1 m.,	Jan.	'12	$132,856	$94,696	$38,161	$51,720	$13,560
1 "	"	'11	150,274	106,037	44,237	49,700	5,462
SAVANNAH ELECTRIC COMPANY							
1 m.,	Jan.	'12	$58,359	$42,399	$15,960	$15,956	$5
1 "	"	'11	53,803	38,172	15,631	15,623	9
SEATTLE ELECTRIC COMPANY							
1 m.,	Jan.	'12	$449,816	$283,274	$166,542	$86,733	$79,809
1 "	"	'11	478,729	297,267	181,462	89,807	91,655

† Deficit.

Traffic and Transportation

Purpose of the Study of Traffic Conditions in Cincinnati

The study which is being made by the city administration in Cincinnati of the local transportation problem is to be a thorough one. As it was felt that this could be done best by an authority familiar with matters of that kind and yet entirely free from possibility of prejudice, the City Council authorized the director of public service to enter into a contract for a complete study and report of the local situation by R. W. Harris, of Madison, Wis.

The arrangement with Mr. Harris provided that he was to begin March 1 and his final report has to be in the hands of the service director not later than Sept. 1. Mr. Harris has been supplied with offices in one of the city buildings and has been promised necessary assistance of the engineering department of the city, as well as such other assistance as the city can render. He will report directly to Victor T. Price, the public service director.

It was generally understood when the present city administration with Mayor Henry T. Hunt at its head was elected and assumed office on Jan. 1 that the local traction situation would be one of the matters that would be considered. It has been known for a long time that the growth of Cincinnati has resulted in a serious congestion of cars on all the routes of the city, since they center almost on one block in the heart of the city. The severe grades and narrow streets in some parts of Cincinnati offer another serious problem, and the fact that the lines from the Kentucky cities immediately across the Ohio River from Cincinnati reach the same congested square as do the city cars adds a further complication. The city administration, through City Solicitor Alfred Bettman, consequently stated that before making any demands for improved service it felt the thing to do was to get the necessary information on which to base such demands. Mr. Bettman stated that the ideal in local traction service was such as would suit public convenience, that opinions might differ as to what public convenience meant, and that even after arriving at what public convenience was it might be found that physical conditions would render it impossible in Cincinnati for service to be given that would entirely meet its requirements. Therefore, it was the intention of the city administration, Mr. Bettman stated, to secure such information as would enable the administration to determine what limitations there were, other than financial, and just how much could be demanded by the city from the company. The investigation outlined by the city for Mr. Harris to undertake is as follows:

1. Thorough study of actual service demands on each line at all times of day and night, from which to construct a schedule of each line which would accord with franchise obligation of running as many cars as public convenience requires.

2. Detailed statement of extent to which services rendered on each line at each of the times of day falls short of above schedule.

3. Study and report upon the extent to which the above defects of service are, with present routing and trackage, unavoidable.

4. Study and suggestions for re-routing over present tracks.

5. Study of present system of stopping place and suggestions as to improvement.

6. Study of the transfer system, its bearing on service and changes that will make the service more in accord with the traffic conditions.

7. Study of equipment, its bearing on the service and suggestions of improvements.

8. Full schedule, according to test of public convenience, on re-routed system with improved stopping places and transfer system and equipment.

9. Report upon such additional trackage or routes as are necessary.

10. Report on effect of the Newport and Covington (Ky.) cars.

11. Report upon any and all other elements (other than financial) that enter into the question of adequate service and public convenience.

R. W. Harris, who is in charge of the work of investigation, has made other investigations in connection with commission regulation of public utilities and traction matters generally. Mr. Harris had his early training with a small Western interurban road and since 1907 has been associated with the joint engineering staff of the Wisconsin Railroad and Tax Commissions and has worked on a complete system of valuing railroads in that State. He has made an exhaustive investigation for these commissions of The Milwaukee Electric Railway & Light Company and has had an important part in the valuing of public utilities generally as well as of railways in Wisconsin. In connection with the Milwaukee work he made exhaustive studies of the local situation in St. Louis, Indianapolis, Minneapolis, St. Paul, Duluth and Chicago. He made a report of the street railway conditions in Lincoln, Neb., for the Nebraska State Railway Commission and is now completing an investigation of the service of the Twin City Rapid Transit Company in Minneapolis. Mr. Harris has also done a considerable amount of work for financial interests connected with various properties, such as the Colonial Savings Bank & Trust Company, Chicago, and others.

The work that Mr. Harris is now undertaking in Cincinnati is important on account of the extent of the property and the serious problems that are to be solved, due to peculiar local operating conditions. While the city has engaged Mr. Harris and is paying him for the investigation, the company has assured the city administration that it will welcome a fair and unbiased study of local conditions in Cincinnati and, furthermore, will co-operate in furnishing every possible facility to the expert employed and in every other way so as to make the investigation thorough and complete and the basis for a successful solution of the problem. In fact, the company, at the request of the city administration, agreed to pay half of the expense of employing the expert, but the city administration finally decided to bear all the expense.

Increase in Wages in Akron, Ohio.—An increase of 1 cent an hour in the wages of all conductors and motormen employed by the Northern Ohio Traction & Light Company, Akron, Ohio, will be made on April 1, 1912.

Safety Gates in Louisville.—The use of safety gates on its cars has been so successful in reducing accidents that the Louisville (Ky.) Railway has decided to equip all of its cars with gates except those with rear platforms too narrow to permit the installation of double-swinging gates.

New Hampshire Commission Dismisses Fare Petition.—The petition of Merrill H. Browne and others against the Exeter, Hampton & Amesbury Street Railway filed on Nov. 21, 1911, with the Public Service Commission of New Hampshire, asking for a reduction in fares and better accommodations, has been dismissed.

Prosecutions in Harrisburg for Abusing Transfer Privilege.—Two residents of New Cumberland were arrested recently at the instance of the Central Pennsylvania Traction Company, Harrisburg, Pa., charged with violating the provisions of the act that was approved June 13, 1911, to prevent the abuse of transfers issued by street railways.

Pittsburgh & Butler Street Railway to Improve Alameda Park.—More than $25,000 will be spent by the Pittsburgh & Butler Street Railway, Pittsburgh, Pa., to improve Alameda Park near Butler, Pa., and S. V. Reeves, general passenger agent of the company, is conducting a campaign to secure picnic and summer excursion traffic for the park.

Produce by Interurban Direct to Market.—Mayor Shank of Indianapolis, Ind., is preparing to construct a siding into the market at Indianapolis so that produce brought into the city on the cars of the interurban railways can be delivered direct. This will aid the Mayor still further in his campaign of selling direct from producer to consumer at cost plus cartage and handling.

Extension of Automobile Collection and Delivery Service.—The Louisville & Northern Railway & Lighting Company, New Albany, Ind., has installed a Walker electric truck in its express department in Louisville. Two of these trucks have been used for some time in New Albany, Ind., to collect and deliver packages in connection with the service given to shippers by the company.

Atlantic Shore Railway to Enter Portsmouth, N. H.—Arrangements have been made by which the cars of the Atlantic Shore Railway will cease to make their terminal at a ferry in Kittery, Me., but will enter Portsmouth, N. H., by the bridge of the Boston & Maine Railroad. Connection in Portsmouth will be made with the tracks of the Portsmouth Electric Railway, which is controlled by the Boston & Maine Railroad.

Injunction Asked Against City in Car Capacity Case.—The South Covington & Cincinnati Street Railway, Covington, Ky., has applied to Judge A. M. J. Cochran, of the United States District Court for the Eastern District of Kentucky, for an injunction to prevent the City Council of Covington from enforcing the ordinance which it passed in October, 1910, to limit the number of passengers to be carried on a car to one and one-third times the seating capacity.

Change in Fare Charged on New York Line.—The Buffalo & Lake Erie Traction Company, Buffalo, N. Y., placed on sale on March 15, 1912, at $5.75 a fifty-four trip monthly commutation ticket book, with coupons good for transportation in either direction between Buffalo and Hamburg. At the same time new regulations and charges were also put into effect covering the movement of foreign passenger cars over the company's tracks between stations.

Near-Side Car in Chicago.—The near-side car which was ordered recently by the Chicago (Ill.) City Railway has been received by the company. The new car is No. 5703, and will be placed in service on the Cottage Grove Avenue line. Leonard A. Busby, president of the company, is quoted as follows: "We are going to try this car, and if it is successful in operation, as it has been in the Eastern cities, we will place an order for 115 more to equip an entire line as soon as possible."

Safety Devices Approved in Toronto.—The Ontario Railway & Municipal Board has approved a number of safety devices which the Toronto (Ont.) Railway has installed on the cars. Corporation Counsel Drayton requested the board to direct the company to provide wheelguards at the back of cars when moving cars at Y's. R. J. Fleming, general manager of the company, said that the company was prepared to substitute loops for all Y's if the City Council would grant the necessary right-of-way on the streets.

Turning Cars in Detroit.—Two cases against the Detroit (Mich.) United Railway in which it was charged that cars were turned before the end of the route was reached without giving passengers transfers to the car in the rear were tried in Judge Connolly's court recently. Attorneys for the company showed that all cars to be turned are marked with the name of the street at which they are to be turned, as well as the name of the route. The corporation counsel's department claimed that transfers should be given in all cases. Decision was reserved.

Fare Petitions to the Nebraska State Railway Commission—The Council of Lincoln, Neb., has before it for action a resolution to request the Nebraska State Railway Commission to order a physical examination of the Lincoln Traction Company's property in order to determine whether the present rates will or will not permit of a reasonable return on the capital invested. The company has already applied to the commission for permission to increase the fare, although the ordinances fix the fare at six rides for 25 cents. The commission had set March 18, 1912, as the date for hearing the application of the company.

Board of Control of Toronto Favors Traffic Report by Experts.—The Board of Control of Toronto, Ont., has decided to recommend to the City Council that Ford, Bacon & Davis, New York, N. Y., be engaged to report on the street railway problem in the city. Comptrollers Foster and Church opposed the plan. Another city official contended that it was advisable for the city to draw up a comprehensive policy for dealing with the street railway problem, and said that this could only be accomplished with the assistance of experts. He said that the opinion of laymen carried no weight with the Railway Board and the corporation and that Corporation Counsel Drayton should have expert testimony to lay before the authorities.

Segregation of Miners from Other Passengers Cannot Be Forced.—The State Railroad Commission of Pennsylvania has announced the result of its investigation of a complaint filed against the Eastern Pennsylvania Railways, Pottsville, Pa., by residents of Schuylkill and Carbon Counties. The commission has decided that in the absence of legislative enactment on the subject there is no way to force the segregation of miners and other workmen from other passengers upon the cars except where cars are supplied with smoking compartments. Where cars without the smoking compartments are operated it appears from the commission's investigation that the miners generally occupy the rear platform or sit together. The commission has suggested that the different industries provide facilities for the men to wash properly before the latter start for their homes.

Concessions in Fare Between Pottsville and Schuylkill Haven.—The Pottsville (Pa.) Union Traction Company has agreed to modify the proposed increase in fares between Pottsville and Schuylkill Haven to the extent of issuing five strip tickets for 30 cents to be good at any time between Pottsville and Schuylkill Haven and from the latter town to Orwigsburg. The tickets will not be restricted to the use of the purchaser and will be sold on the cars by the conductors. Persons not buying the strip tickets will have to pay a fare of 10 cents or they may secure a return trip ticket for 15 cents. The company also agrees to sell these tickets on the cars. The company declined to make a straight 6-cent fare because the conductors would be required to carry so much small change. While the 6-cent strip tickets will raise the fare to Schuylkill Haven 1 cent, they will reduce the fare to Orwigsburg 3 cents a trip or 6 cents both ways.

Seats for Conductors in New Orleans, La.—D. A. Hegarty, manager of the railway department of the New Orleans Railway & Light Company, New Orleans, La., made the following statement recently in regard to the ordinance passed by the City Council requiring the company to furnish stools for the use of conductors within certain prescribed territorial limits as referred to in the Electric Railway Journal of March 16, 1912, page 444: "We are now working on several designs of seats with the view of adopting the one which offers the greatest advantages of comfort for the men and economy of space on the car. We believe we have worked out a design that will prove satisfactory, in the shape of a folding seat to be attached to the dashboard of the car, and these will be placed on the cars as rapidly as possible. One of our carmen has suggested a strap seat made of leather, and this design is being considered also, as it makes a comfortable seat and can also be removed when not in use."

Illuminated Destination Signs for New York Subway.—The Interborough Rapid Transit Company, New York, N. Y., has announced that it proposes to install illuminated signs at its stations on the subway division on which the destination of trains will be flashed as they approach the stations. This change by the company prompted the New York *Evening Post* to comment as follows on the improvements made by the company in the interest of its patrons: "Eight years is not a long stretch of time, yet in that period so many changes of one sort or another have been made in the trappings and the mechanical equipment underground that you would almost suppose the subway was controlled by fickle Dame Fashion. If a train of cars like the trains that were considered so new and wonderful to behold when the subway first opened were to be sent uptown at the rush hour to-night, veteran passengers would probably rub their eyes and wonder who had let the Overland stagecoach in. Of course, that is a bit of exaggeration. But it isn't so far wrong as many would suppose who do not stop to realize how many frills and furbelows have been introduced into their subway since 1904."

Service in Akron.—The Northern Ohio Traction & Light Company, Akron, Ohio, has completed a statement to be presented to the Public Service Commission in reply to the complaint filed by city officials of Akron to the effect that the car service was unsatisfactory. The company asserts that it is making every effort to better conditions; that it is making extensive improvements and that there is really no ground for complaint. The Akron **Times**, in its issue of March 14, 1912, described the improvements that are being made and are to be made in the future by the

company. The *Times* asserted that it was doubtful whether there was any other city in the country, similar in topography to Akron, that had more efficient street railway service. Forty-two extra cars were operated during the rush hours. The company was spending $1,500,000 in the construction of new power plants and planned to construct large shops and carhouses at Kenmore, lay track on private right of way, build a local terminal, eliminate dangerous curves and otherwise improve the local lines. Until four years ago all the profits were put back into the business and no dividends were paid. The article concluded that there was no ground for an attack on the company.

P. S. C. Sustained by Court Decision in Fare Suit in New York State.—Justice Cochrane, of the Supreme Court of New York, has handed down a decision sustaining the Public Service Commission of the Second District of New York in a suit instituted before him to require the Westchester Street Railroad to carry passengers between White Plains and Mamaroneck in either direction for a single fare of 5 cents. The company is now charging 10 cents. The controversy has arisen over a franchise granted by Mamaroneck in 1898 which required the Tarrytown, White Plains & Mamaroneck Street Railroad to carry passengers between these points for a single fare of 5 cents. A mortgage on the Tarrytown, White Plains & Mamaroneck Street Railroad's properties was foreclosed about two years ago and the property sold in parcels. The Westchester Street Railroad was organized to take over a part but not the whole of the original right-of-way. The point decided by the court is that the 5-cent franchise was charged upon the entire property and hence that all parts of it are subject to the 5-cent fare. The question is new in New York State, and while the case has been argued twice before Justice Cochrane and once in the Appellate Division counsel on neither side has been able to cite any exact precedent. It is expected that an immediate appeal will be taken to the Appellate Division. Justice Cochrane has granted a stay provided the appeal is argued and disposed of at the May term of the Appellate Division.

Merit System in Los Angeles.—The Pacific Electric Railway, Los Angeles, Cal., has recently adopted the merit system of discipline. The company, in a statement to its employees, said in part: "The practice of administering discipline by suspension will be discontinued and a system of record suspension will be substituted, under which the employee will be allowed to continue at work, and demerit marks, corresponding in number as far as practicable to the number of days employees are now kept off duty, will be noted against each employee's record in the office of the superintendent. All employees will be started with a clear record. The accumulation of seventy-five demerits will result automatically in discharge from the service. When fifty demerits have accrued the employee will be called to the office and shown the lines along which he must improve if he expects to be retained. No suspension will be recorded without notice to the person affected and an opportunity given for explanation. Any employee may have access to his own record at any time. If a discharged employee feels there are extenuating circumstances, he may appeal personally to the superintendent, and if his re-employment is approved by proper authority, the debit against his record will commence at fifty demerits. The second accumulation of seventy-five demerits will permanently retire the employee. Credit will be allowed for meritorious service, commendable acts, deeds of heroism and loyalty, good judgment in emergencies, etc., by a like method of merit marks, the number of which will cancel a corresponding number of demerits. If at the time the employee's record is clear, the credit will apply against a future debit. Record bulletins will be issued by the superintendent monthly, showing for educational purposes a brief account of each case resulting in discipline, and stating, when necessary, how it could have been avoided, but giving no names or information identifying the person at fault. This system is inaugurated with a view to furthering the welfare of the employee in that it will not work financial hardship upon him, and to securing a higher state of efficiency in that it will act as an incentive to meritorious service, which it has not been practicable heretofore to recognize in a substantial way."

Personal Mention

Mr. Raymond R. Eagle has been appointed engineer of the New Berne (N. C.) Street Railway, now under construction.

Mr. G. G. Crane, for the last five years electrical engineer of the Rockford & Interurban Railway, Rockford, Ill., has resigned to become superintendent of the water department of the city of Rockford.

Mr. C. A. Call has resigned as assistant general passenger agent of the New York, New Haven & Hartford Railroad, with offices in Boston, to become general passenger agent of the New York, Westchester & Boston Railway, which is to be placed in operation soon.

Mr. J. A. Greenland, who has been traveling passenger and freight agent of the Fort Wayne & Northern Indiana Traction Company, Fort Wayne, Ind., has been appointed general passenger and freight agent of the company to succeed Mr. A. A. Karthroll, resigned.

Mr. E. F. Peck, whose resignation as general manager of the Schenectady (N. Y.) Railway became effective on March 18, 1912, will hereafter devote his entire time to the interest of Allen & Peck, Inc., of which he is vice-president. A portrait and a brief biography of Mr. Peck were published in the Electric Railway Journal of Jan. 20, 1912, in which issue on page 93 mention was made of the organization of Allen & Peck, Inc.

Mr. Arthur Hodges was the guest of the engineers of the road department of the Bay State Street Railway, Boston, Mass., at a banquet in the Elks' Home, Boston, recently. Mr. Hodges, who was connected with the railway as assistant to the roadmaster, was appointed an inspector of street railways by the Railroad Commission recently. A gold watch was presented to Mr. Hodges by his associates connected with the Bay State Street Railway.

Mr. Herman Moeller has resigned as auditor of passenger receipts of the Portland Railway, Light & Power Company, Portland, Ore., to engage in business for himself. He has been with the company and its predecessors since 1891. He acted as cashier of the City Suburban Railway from 1894 to 1905, when the consolidation took place. Since the organization of the Portland Railway, Light & Power Company he has had charge of the ticket and register accounting.

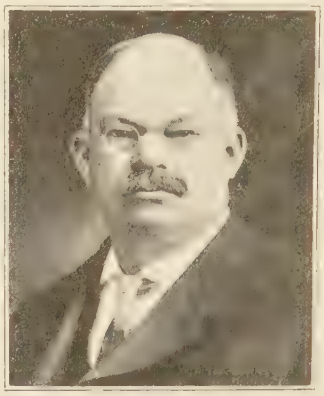
Mr. Thomas Dolan has resigned as president of the United Gas Improvement Company, Philadelphia, Pa., and has been elected chairman of the board of directors of the company. For fifty years Mr. Dolan has been connected prominently with industrial development in Philadelphia and the public service corporations of the city. His connection with the United Gas Improvement Company dates from its organization. Mr. Samuel T. Bodine, formerly first vice-president of the company, has been elected president to succeed Mr. Dolan.

Mr. J. F. Strickland, chairman, and Mr. Osce Goodwin, treasurer of the J. F. Strickland Company, Dallas, Tex., were the guests of honor at a banquet given by 200 business men from six Texas counties, in honor of their success in financing the Dallas-Waco-Corsicana interurban line, which includes about 134 miles of proposed new road. The new company will be known as the Southern Traction Company and will construct lines from Dallas to Waco and Corsicana by way of Ferris. The cost of construction will be about $5,200,000.

Mr. H. W. Clapp, whose appointment as assistant electrical engineer of the Southern Pacific Company under Mr. A. H. Babcock was noted in the Electric Railway Journal of Feb. 24, 1912, was superintendent of motive power of the Brisbane (Australia) Tramways before he came to America. He entered the service of the General Electric Company in 1902 and spent five and one-half years in and about New York in some of the most important electric railway propositions as special representative of the railway engineering and construction departments of the General Electric Company. He gave particular attention to the installation and operation of the rolling equipment used in the electrification of the New York Central & Hudson River Railroad and

to the cars for the Interborough Rapid Transit Company's system. He also supervised the work of equipping the cars of the West Jersey & Seashore Railroad. Mr. Clapp resigned from the General Electric Company in the fall of 1907 to become connected with the electrical engineering department of the Southern Pacific Company.

Mr. Thomas Lees, the newly elected president of the New England Street Railway Club, is general superintendent of Division 2 North of the Bay State Street Railway, with headquarters at Lowell, Mass. He entered street railway work as a conductor with the Lowell Horse Railroad in 1888, and became in succession conductor and motorman on electric cars. He was soon made assistant starter in Merrimack Square, Lowell, and then starter at the same place. In 1889 he was appointed division superintendent in Nashua, N. H., but returned to Lowell as division superintendent in 1901. In 1905 he was made general superintendent of Division 2 of the Boston & Northern Street Railway, which is now part of the Bay State Street Railway. Mr. Lees holds the same relative position now, and his general division covers the subdivisions of Lowell, Nashua, Lawrence, Haverhill and Woburn.



T. Lees

Mr. H. B. Fleming, chief engineer of the Chicago (Ill.) City Railway, has been elected vice-president of the company to succeed Mr. R. B. Hamilton, resigned. Mr. Fleming has been connected with the Chicago City Railway for eleven years. He was educated at Washington University, St. Louis, Mo., where he did post-graduate work after obtaining his degree as bachelor of science and the degree of master of engineering. For three years he was assistant engineer of the water department of St. Louis. He next entered the employ of the St. Louis Transit Company and the National Railway, St. Louis, Mo., with which companies he remained for two years. He was appointed a member of the Board of Supervising Engineers, Chicago Traction, in 1907 to represent the Chicago City Railway.

Mr. Talmadge C. Cherry, who has been appointed general manager of the Schenectady (N. Y.) Railway, has been connected with the Utica & Mohawk Valley Railway as superintendent since June, 1909. Mr. Cherry was graduated from Syracuse High School in 1894 and entered Syracuse University, where he took a two-year course in engineering and a two-year course in Syracuse Law School. In May, 1898, he worked as timekeeper on construction and track work and rodman with the engineers of the Syracuse Rapid Transit Railway. On Jan. 1, 1900, he was made superintendent of track of the company. Later in 1900 Mr. Cherry went to Lorain, Ohio, as superintendent of construction of line and track under Mr. C. Loomis Allen, who was then general manager of the Lorain Street Railway. Mr. Cherry also served as dispatcher on the Lorain Street Railway, and from August, 1901, to December, 1903, he was general manager of the company. Since that time Mr. Cherry has been general superintendent of the Saginaw Valley Traction, Light & Gas Company, general manager of the Ohio Central Traction Company, superintendent of the Buffalo & Lake Erie Traction Company for three years, and superintendent of the Utica & Mohawk Valley Railway for three years. Mr. Cherry is thirty-six years old. He has been an active member of the Street Railway Association of the State of New York and of the American Electric Railway Association, and for the last two years he has been a member of the committee on fares and transfers of the American Electric Railway Transportation & Traffic Association, serving during 1912 as chairman of this committee.

T. C. Cherry

Mr. L. D. Pellissier, who was recently elected general manager of the Holyoke (Mass.) Street Railway to succeed Mr. William L. Loomis, was born in 1870 and was educated at the Hopkins Academy, in Hadley, Mass. In 1890 he was accepted as a conductor on the Holyoke Street Railway and successively held the positions of money counter, cashier and bookkeeper. When the office of treasurer became vacant Mr. Pellissier was elected to that position. He also filled the position of claim agent and succeeded in reducing materially the amount of payments made to settle claims. In 1910 he was also elected treasurer and general manager of the Northampton (Mass.) Street Railway, which operated 24 miles of road and had not paid dividends for three successive dividend periods. The affairs of that road he soon improved and systematized, and dividends were resumed. During much of his service with the Holyoke Street Railway Mr. Pellissier has been in charge of the casino and amusements and the restaurant at Mountain Park, and the café, amusements and souvenir departments at Mount Tom.

Mr. Charles J. Griffith, whose appointment as general manager of the Little Rock Railway & Electric Company, Little Rock, Ark., was noted recently in the Electric Railway Journal, was born in Rochester, N. Y., on Feb. 15, 1865, and was educated in Lafayette, Ind. He engaged in the telegraph business until 1889, when he became associated with the Municipal Light & Power Company, St. Louis, Mo., and the Missouri-Edison Electric Light & Power Company. In 1890 he was associated with the Pine Bluff Water & Light Company, Pine Bluff, Ark. In 1892 he entered the service of the Little Rock Traction & Electric Company, but resigned from that company in August, 1897, to accept a position with the Brown Electric Company, Little Rock, as superintendent of construction. This company constructed an electric light and power plant for the State of Arkansas to light all of the state institutions at Little Rock. Mr. Griffith afterward superintended the installation of the electric light plants in the Peabody and the Cordova Hotels at Memphis, Tenn., and supervised the installation of an electric light plant at Crystal Springs, Miss. In 1899 he became associated with the Southern Engineering Company, St. Louis, Mo., and superintended the installation of the municipal electric light plant in Hastings, Neb., and the electric light and water works in West Plains, Mo. In 1902 he re-entered the service of the Little Rock Railway & Electric Company as master mechanic and was appointed superintendent of the railway department in 1905.

C. J. Griffith

OBITUARY

John F. Hill, president of the Atlantic Shore Electric Railway, Sanford, Maine, is dead. Mr. Hill was born in Eliot, York County, Maine, on Oct. 29, 1855. He was graduated as a physician, but he decided to enter business, and became a partner of Mr. P. O. Vickery under the firm name of Vickery & Hill. He was elected to the House of Representatives of Maine in 1889, and in 1891 he was re-elected. In 1892 he was elected Senator from Kennebec County, and he served in the Legislatures of 1893 and 1895. Mr. Hill was elected Governor of Maine in 1900, and was re-elected two years later. He was president of the Augusta National Bank, a trustee of the Kennebec Savings Bank and a director in several electric railways in Maine.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

***San Diego, Riverside & Los Angeles Railway, San Diego, Cal.**—Application for a charter has been made in California by this company to build an electric railway between San Diego and Los Angeles. Capital stock, $6,000,000. Incorporators: William F. Louvet and Maurice Salzeman, Los Angeles, and John F. Scott, J. H. Carlisle and A. N. Gaston, San Diego.

***Indianapolis, New Castle & Northeastern Traction Company, Indianapolis, Ind.**—Application for a charter has been made in Indiana by this company to build an electric railway to connect Indianapolis, Shirley, Kennard, New Castle, Hagerstown, Richmond, Lynn, Winchester and Muncie. Capital stock, $10,000. Incorporators: Joseph T. Elliott, George B. Elliott, Helen E. Clayton and Henry H. Hornbrook.

Garrett County Railway, Oakland, Md.—Application for a charter has been made in Maryland by this company to build an electric railway from Oakland to Frostburg, via Mountain Lake Park, Deer Park, Thayersville, Hoye, Accident, Grantsville and Friendsville. Incorporators: G. J. Gnagley, H. M. Speicher, W. Ravenscroft, J. Schaub and James Frenzel. [E. R. J., Apr. 2, '10.]

***Flathead Power & Traction Company, Polson, Mont.**—Application for a charter has been made in Montana by this company to build an interurban railway between Polson and Dixon. Capital stock, $150,000. Incorporators: F. L. Gray, C. R. M. Stritzel, T. R. Arnold, F. F. Faucett, M. A. Myhre and A. W. Pipes, all of Polson.

Lindsay & Minden Railway, Minden, Ont.—Incorporated in Ontario to build an electric railway from Lindsay to Minden, with branches to Balsam Lake and Fenelon. John H. Delemere, Minden, Ont., is interested. [E. R. J., Feb. 10, '12.]

Porcupine-Rand Belt Electric Railway, Porcupine, Ont.—Incorporated in Ontario to build an interurban railway from a point near the eastern boundary of the Province of Ontario in McGarry to Larder City, McVittie, Hearst, Gauthier, Eby, Burt, Holmes, Alma, Bartlett, Musgrove and Doyle. [E. R. J., Jan. 6, '12.]

***Upaliki & Southern Railway, Pierre, S. D.**—Application for a charter has been made in North Dakota by this company to build a 10-mile steam or electric railway between Upaliki and Flintville. Capital stock, $100,000. Headquarters at Pierre, S. D., and Upaliki, Mo. Incorporators: Thomas Graham, Edward P. Flint, George D. Talmadge, E. C. Talmadge, all of Chicago, and J. W. Laughlin, of Pierre, S. D.

***East Tennessee Traction Company, Nashville, Tenn.**—Chartered in Tennessee to build a 30-mile electric railway from Cleveland to Chattanooga. Capital stock, $100,000. Incorporators: J. W. Adams, George B. Adams, B. C. Roper, Lewis M. Coleman and William L. Frierson.

FRANCHISES

***Gadsden, Ala.**—Louis Hart, Gadsden, has received from the City Council of Gadsden a franchise for an electric railway from Gadsden to the Bellview Hotel, on the top of Lookout Mountain. This line is stated to have been financed and will be 3 miles in length.

Montgomery, Ala.—The Alabama Traction Company has received an extension of time on its Montgomery franchise.

Bisbee, Ariz.—The Warren-Bisbee Railway, Warren, has received a franchise from the City Council for an extension on Main Street in Bisbee.

Nanaimo, B. C.—The City Council has applied to the Legislature for permission to build an electric railway in Nanaimo, subject to the approval of the ratepayers. [E. R. J., Feb, 17, '12.]

Pomona, Cal.—The Ontario & San Antonio Heights Railroad, Ontario, has received a franchise from the City Council in Pomona.

Santa Barbara, Cal.—The Santa Barbara Consolidated Railroad will ask the City Council for a forty-five-year franchise. It is understood that the company will give the city the right of purchase after thirty-five years at a price to be set by a board of appraisers, and agree to turn over to the city 2 per cent of its gross receipts. If the Council agrees the company will immediately issue $500,000 in bonds, one-half for immediate needs and the remainder to be used for future improvements.

Belleville, Ill.—The Belleville & Mascoutah Traction Company, Belleville, has received a franchise from the City Council in Belleville. A portion of the grading between Belleville and Mascoutah has been completed.

Charleston, Ill.—The Central Illinois Public Service Company, Mattoon, has received a fifty-year franchise from the City Council in Charleston.

Milan, Ill.—The Tri-City Railway & Light Company, Davenport, has asked the County Supervisors for an extension of time on its franchise in Milan.

Evansville, Ind.—The Evansville, Henderson & Owensboro Traction Company has received a franchise from the City Council in Evansville. The company recently bought the abandoned tracks of the Illinois Central Railroad between Evansville and Henderson and will electrify the line. The company has also been granted a franchise from the City Council in Henderson. [E. R. J., Mar. 2, '12.]

Louisville, Ky.—An electric railway franchise, providing for an extension of traction facilities in the extreme northwestern portion of Louisville, has been introduced into the General Council by Alderman Clifford, and is now in the hands of the contract committee of the Board of Aldermen. The franchise will probably be purchased at the upset price of $1,000 by the Louisville Railway. The new franchise provides for a very important improvement in railway facilities. It is proposed that a line be extended from the terminal of the West Main Street connection to Thirtieth Street and Alford Avenue, passing through Youngstown. The Southern Railway has agreed to erect a suburban passenger station in Youngstown if the line is extended.

Shreveport, La.—The Shreveport Traction Company has asked the City Council for a franchise for an extension in Shreveport.

Great Barrington, Mass.—The Railroad Commission has approved the franchise granted to the Berkshire Street Railway, Pittsfield, by the Selectmen in Housatonic and for the electrification of the state line branch.

Albert Lea, Minn.—The Sioux Falls & Southern Minnesota Traction Company, Pierre, S. D., will ask the City Council for a franchise in Albert Lea. This 110-mile line will connect Sioux Falls, S. D., and Albert Lea, Minn., via Worthington, Luverne, Loon Lake, Dresden and Petersburg. G. P. Peterson, Pierre, S. D., is interested. [E. R. J., Mar. 2, '12.]

***Roundup, Mont.**—M. H. Wall, August Schrump, H. E. Marshal and Martin Rausch have received a twenty-year franchise from the Board of County Commissioners to build an electric railway between Roundup, Farrell, Lavina and Davis.

Red Bank, N. J.—The Jersey Central Traction Company, Keyport, has asked the City Council for a franchise in Red Bank.

Kittanning, Pa.—The Kittanning & Leechburg Street Railway has asked the City Council for a franchise on Rebecca Street, Kittanning.

Pittsburgh, Pa.—The Pittsburgh Railways has asked the City Council for franchises to extend many of its lines in Pittsburgh. This is part of the plan to spend a considerable sum in general rehabilitation work.

Richmond, Va.—H. C. Cutting, president of the Point Richmond Land & Canal Company, has received a thirty-five-year franchise from the City Council to build an electric railway over Cutting Boulevard from the city limits to Richmond Avenue in Richmond. [E. R. J., Mar. 9, '12.]

Centralia, Wash.—The Centralia Electric Light & Traction Company has received a franchise from the City Commission in Centralia. [E. R. J., Dec. 1, '11.]

TRACK AND ROADWAY

Montgomery (Ala.) Traction Company.—A 6-mile extension will be built by this company to Lederach in the near future.

***Greenville, Ky.**—J. Rose, engineer for the Greenville Light & Water Company, has under consideration a plan to construct an interurban line from Greenville to the Green River by way of Central City. The proposed route would follow the line of the Illinois Central Railroad and would pass through seven coal-mining towns. Part of the plan involves the construction of a power house at some central point for the operation of the line and to serve coal mines along the way.

***Harrodsburg, Ky.**—Business men plan to build an electric line to Lawrenceburg and Danville. It is suggested that power can be secured from a water power plant being constructed on Dix River 15 miles from Harrodsburg. W. P. Harvey, president of the Commercial Club, is interested.

***Fairfield, Maine.**—Amos F. Gerard, Fairfield, is considering plans to build an 11-mile electric railway between Albion and Fairfield. The Benton & Fairfield Railway covers 4 miles of the route, leaving 7 miles to build. A connection with the seacoast at Wiscasset by means of a deal with the Wiscasset, Waterville & Farmington Railway, a narrow-gage steam line, at Albion is suggested.

Winnipeg (Man.) Electric Railway.—This company has prepared plans for the extension of its Winnipeg-Selkirk line by the construction of a line to Stony Mountain and Stonewall, starting from near Middle Church. The company is given a free right-of-way in Rockwood.

***Hagerstown, Md.**—Plans are being prepared for the construction of an electric railway from Martinsburg to Williamsport, to connect at Williamsport with the lines of the Hagerstown Railway.

Mexico (Mex.) Tramways.—Work will soon be begun by this company on its two extensions. One line will run to Toluca, a distance of 60 miles, and the other will go to Puebla, a distance of 125 miles.

Ludington, Mich.—The western route of the proposed electric railway from Muskegon to Manistee was unanimously favored at a meeting last week of representatives of the counties. Preliminary steps were taken looking toward the organization of a corporation to be capitalized at $25,000. Options will be procured and work of surveying will be taken up at once along the 90-mile route, which will take in Muskegon, North Muskegon, Dalton, Whitehall, Montague, Rothbury, New Era, Shelby, Mears, Hart, Pentwater, Ludington and Manistee. Herman O'Connor, Holton, is interested. [E. R. J., Dec. 23, '11.]

Meridian Light & Railway Company, Meridian, Miss.—Work will be begun at once by this company on several extensions in Meridian.

Missouri & Kansas Interurban Railway, Kansas City, Mo.—This company plans to install switches and special work on its new city Market House line in Kansas City. Contracts will be let during the next six weeks.

Ilion (N. Y.) Street Railway.—This company advises that as yet this proposed railway is in the preliminary stage. E. L. Doty, Ilion, is interested. [E. R. J., March 9, '12.]

Ocean Electric Railway, New York, N. Y.—This company has been asked to build an extension from Far Rockaway to Valley Stream.

Hudson River & Eastern Traction Company, Ossining, N. Y.—During the year this company plans to build an extension from Ossining to White Plains, a distance of 16 miles.

Youngstown & Sharon Railway & Light Company, Youngstown, Ohio.—This company will double-track its line through Hubbard in the near future.

Ardmore, Duncan & Lawton Railway, Ardmore, Okla.—Surveys have been made and work will be begun about May 1 on the construction of this 100-mile electric railway between Ardmore, Duncan and Lawton. J. L. Hamon, president. [E. R. J., July 15, '11.]

Lawton & Fort Sill Electric Railway, Lawton, Okla.—This company has secured the extension and transfer of the right-of-way granted to David L. Sleeper and associates of the original company across the military reservation to Fort Sill from the War Department at Washington, D. C. The company must also secure the right-of-way from the Secretary of the Interior for crossing the Indian school reserve. Charles Holt, Lawton, is interested. [E. R. J., May 21, '10.]

Enid Interurban Traction Company, North Enid, Okla.—A 3-mile extension will be built by this company from Enid to North Enid.

Berlin & Bridgeport Electric Street Railway, Berlin, Ont.—During 1912 this company plans to build between Bridgeport and Elora, a distance of 16 miles.

Hamilton, Grimsby & Beamsville Electric Railway, Hamilton, Ont.—This company intends to build a line from Hamilton to St. Catharines, over private right-of-way, and use its present line which is operated on public highway as a line between towns from Hamilton to Beamsville.

Ottawa (Ont.) Electric Railway.—This company will soon build in Ottawa the Ottawa South loop, the Preston Street loop and an extension of the Wellington Street line.

Port Arthur & Fort William Electric Railway, Port Arthur, Ont.—The City Council has applied to the Legislature for confirmation of a number of by-laws, including one to authorize the expenditure of $17,500 upon an extension of this railway in Port Arthur easterly. Power is also sought to extend the lines outside the city limits.

Niagara Falls, Welland & Dunnville Electric Railway, Welland, Ont.—An application is in the hands of the provincial government for this company to allow it to issue bonds for $30,000 instead of $20,000 as its present privilege permits. If this bill is passed the construction of the line will be started in the spring. The line will be 40 miles long and right-of-way is under option. Arrangements are being made with an English firm to construct the line. This railway will connect Niagara Falls, Welland and Dunnville. [E. R. J., Dec. 31, '10.]

Duquesne & Dravosburg Street Railway, Duquesne, Pa.—This company plans to construct 3 miles of new track during the year.

Hummelstown & Campbellstown Street Railway, Hershey, Pa.—Plans are being made by this company to build a line between Hummelstown and Harrisburg, via Steelton and Oberlin.

Johnstown & Altoona Railway, Johnstown, Pa.—This company plans to build 32 miles of track between South Fork and Altoona, Pa., during 1912.

People's Street Railway, Nanticoke, Pa.—During the year this company plans to build 1½ miles of new track on its Hanover division at the Rhone terminus to connect with Warrior Run.

Philadelphia & West Chester Traction Company, Philadelphia, Pa.—This company will soon build an extension from Sixty-ninth Street, Philadelphia, to Media. Plans will be considered to extend the line to Westtown and West Chester.

Westmoreland County Railway, Pittsburgh, Pa.—This company plans to begin work soon on an extension to connect Derry, Millwood, Hillside, Cokeville and across the Conemaugh River into Blairsville.

Pottstown & Phoenixville Railway, Pottstown, Pa.—Work will soon be begun by this company on its line to connect the Pottstown & Reading Street Railway and the Montgomery & Chester Electric Railway. This proposed line will go through Pottstown, Royersford, Spring City, Phoenixville and Valley Forge. George N. Malsberger, president. [E. R. J., March 9, '12.]

Reading (Pa.) Transit Company.—Plans are being made by this company to extend its line around the approach of the proposed new Penn Street bridge in Reading. Application for a franchise will soon be made.

Wilkes-Barre (Pa.) Railway.—Bids are being asked by this company to add four 175-ft. river spans to the present bridge for the purpose of double-tracking.

Manila Electric Railroad & Light Company, Manila, P. I.—This company will construct 6½ miles of new track during 1912.

Regina Municipal Railway, Regina, Sask.—During the year this company plans to build 2½ miles of track with

80-lb. T-rails and paved track and 15½ miles with 60-lb. T-rails and ballasted track.

Columbia Railway, Gas & Electric Company, Columbia, S. C.—During 1912 this company will construct 2 miles of new track.

Carolina Traction Company, Rock Hill, S. C.—Plans are being considered by this company to build an extension to Florence.

Chicago, Burlington & Quincy Railway, Deadwood, S. D.—Work will soon be begun by this company on the extension between Lead and Deadwood to the city park south of Lead, thus giving connection by third-rail with Terry.

Davenport, Iowa City & Western Traction Company, Pierre, S. D.—This company has completed the surveys between Iowa City and Maysville. Surveying is now being done between Maysville and Davenport. Financial backing is being secured. This 70-mile line will connect Davenport and Iowa City, with a branch to Tipton. C. E. Coon, Omaha, Neb., is interested. [E. R. J., Mar. 9, '12.]

Sioux Falls (S. D.) Traction Company.—During the next few weeks this company will award contracts to build 2 or more miles of new track to New Park, etc.

Brownsville Street & Interurban Railway, Brownsville, Tex.—This company, organized to build an electric railway in and near Brownsville, has taken over the franchise granted recently to S. A. Robertson, San Benito. S. L. Dwerman, Brownsville, is interested. [E. R. J., Mar. 9, '12.]

Dallas-Waxahachie Interurban Railway, Dallas Tex.—Rails are being laid on the 30-mile railway between Dallas and Waxahachie, via Lancaster, Red Oak and Sterrett. E. Moore, Dallas, manager. [E. R. J., July 8, '11.]

Texas Traction Company, Dallas, Tex.—Work has been begun by this company on Hull Street in Denison. This is the first of several extensions to be built by this company in Denison.

Northern Texas Traction Company, Fort Worth, Tex.—This company will double-track part of its interurban line between Fort Worth and Dallas during the year. It will built at once a 7-mile line between Fort Worth and Handley.

Houston (Tex.) Electric Company.—Within the next few weeks Stone & Webster will begin the construction of an extension from Houston to Montrose.

Utah Light & Railway Company, Salt Lake City, Utah.—Two extensions will be built at once by this company in Salt Lake City. The Sugar House line will be extended to Holliday. The other extension will be built from the new high school site at Ninth Street south to Fifteenth Street to a connection with the present Sugar House line terminus.

Lynchburg Traction & Light Company, Lynchburg, Va.—This company plans to build an extension and some double-tracking in Lynchburg.

Seattle & Eastern Railway, Seattle, Wash.—Work will be begun by this company on April 1 on its 15-mile electric railway from the east side of Lake Washington to Issaquah and Factoria. A ferry system from the passenger terminal on the east side of the lake will be operated to and from Seattle. The following officers have been elected: R. S. Terhune, president; James Campbell, Hervey Lindley, John L. Anderson, Samuel A. Moss and William H. Underwood, San Francisco, and L. Y. Koady, Portland. [E. R. J., Dec. 16, '11.]

Yakima Valley Transportation Company, Yakima, Wash.—Contracts have been let, material is all on hand and work will soon be begun by this company on its 7-mile line into Selah Valley, north of North Yakima.

Clarksburg (W. Va.) Northern Railway.—This company has awarded a contract to grade an extension from Middlebourne to Shirley, a distance of about 16 miles, to Joseph Fuccy. I. M. Underwood, Middlebourne, vice-president. [E. R. J., Aug. 5, '11.]

Chippewa Valley Railway, Light & Power Company, Eau Claire, Wis.—This company plans to build this year its projected interurban line from Eau Claire to Altoona.

Miwaukee Western Electric Railway, Milwaukee, Wis.—During 1912 this company plans to build 74 miles of new track. One line will be built between Milwaukee and Fox Lake and another from Sussex on the main line to Waukesha.

SHOPS AND BUILDINGS

Central California Traction Company, Sacramento, Cal.—This company has completed its new depot at Wilton.

Terre Haute, Indianapolis & Eastern Traction Company, Terre Haute, Ind.—Contracts will soon be awarded by this company for the construction of a new station at Terre Haute.

Gulfport & Mississippi Coast Traction Company, Gulfport, Miss.—This company is enlarging its main repair shop at Gulfport by the construction of an addition which will be 60 ft. x 110 ft. in size. After the new building has been completed the following new tools will be installed: wheel-boring mill, wheel press, radial drill, shaper and 24-in. lathe. W. F. Gorenflo, Gulfport, is general manager of this road.

Missouri & Kansas Interurban Railway, Kansas City, Mo.—During the next six weeks this company will award contracts to build a new carhouse and warehouse.

Kittanning & Leechburg Street Railways, Kittanning, Pa.—Plans are being made by this company to build a carhouse and repair shop on Rebecca Street in Kittanning. The cost will be $16,000.

Reading (Pa.) Transit Company.—A new carhouse will probably be built by this company outside the city limits of Reading. In addition to the carhouse there will be buildings to be used as a machine shop, carpenter department and paint shop. The main offices, it is said, will remain in Reading.

Wheeling (W. Va.) Traction Company.—Plans are being considered by this company to build a new carhouse in Wheeling.

POWER HOUSES AND SUBSTATIONS

British Columbia Electric Railway, Vancouver, B. C.—Work has been begun by this company on a new substation in Collingwood.

Southwestern Traction & Power Company, New Orleans, La.—The site for this company's new power house will be 3 miles from New Iberia. The contract for the building has been awarded to Jerry & Taylor, who will begin the construction at once.

Gulfport & Mississippi Coast Traction Company, Gulfport, Miss.—This company has ordered from the General Electric Company one 2000-kw horizontal-type turbine which is to be delivered by June 1, 1912. Additional condenser equipment will be installed with this turbine, and the steam plant will be increased by the addition of a 440-hp Babcock & Wilcox boiler. The new 2000-kw turbine will replace a 500-kw unit that has been in operation some years. After the contemplated additions have been made, the generating equipment of this station will include Westinghouse turbines of 500-kw and 1500-kw capacity and the 2000-kw Curtis turbine. In connection with the increase of the generating capacity it will be necessary to enlarge the condensing water facilities at this plant, which include a pond in which a seven-day supply of water may be trapped at high tide. At low tide this water flows by gravity to a well near the power house, which well also may be fed through a 1500-ft. concrete channel leading from deep water in the gulf. W. F. Gorenflo, Gulfport, is general manager of this property.

Tidewater Power Company, Wilmington, N. C.—This company has purchased a 2,000-kw Westinghouse-Parsons turbo-generator, one 40-kw exciter set and one Le Blanc condenser for its power house in Wilmington.

Slate Belt Electric Street Railway, Pen Argyl, Pa.—This company will enlarge its power house in order to install additional equipment.

Scranton & Binghamton Traction Company, Scranton, Pa.—This company expects to purchase a portable substation which will be placed on its Lake Winola branch in a few weeks.

Centralia Electric Light & Traction Company, Centralia, Wash.—This company has completed its new power house in Centralia.

Manufactures and Supplies

ROLLING STOCK

Rockford & Interurban Railway, Rockford, Ill., is figuring on six double-truck cars.

Easton (Pa.) Transit Company expects to purchase several semi-convertible single-truck car bodies.

De Kalb-Sycamore & Interurban Traction Company, De Kalb, Ill., is in the market for two interurban cars.

Pittsburgh & Butler Street Railway, Pittsburgh, Pa., is said to be in the market for several side-dump trail gondola cars.

Homestead & Mifflin Street Railway, Homestead, Pa., has ordered one nine-bench open car from the St. Louis Car Company.

Missoula (Mont.) Street Railway has ordered one 30-ft. 8-in. interurban car body with trucks from the American Car Company.

La Crosse (Wis.) City Railway has ordered two 21-ft. car bodies mounted on St. Louis No. 46 trucks from the St. Louis Car Company.

Wellsburg, Bethany & Washington Traction Company, Wellsburg, W. Va., has ordered one 25-ft. 4-in. closed body mounted on Brill 39-E trucks from the G. C. Kuhlman Car Company.

Parkersburg, Marietta & Interurban Railway, Parkersburg, W. Va., expects to purchase two combination passenger and express cars, one box car and one gondola car for freight.

Geary Street Municipal Railway, San Francisco, Cal., has issued specifications for forty-three cars, according to plans drawn by Bion J. Arnold, of Chicago, the previous bids having been rejected.

Yakima Valley Transportation Company, North Yakima, Wash., expects to purchase two passenger interurban cars with baggage and smoking compartments, also one freight and express motor car.

Arkansas Valley Interurban Railway, St. Louis, Mo., has ordered three interurban motor coaches, two trailer coaches and one work car, all to be mounted on St. Louis No. 23-B trucks, from the St. Louis Car Company.

Toledo Railways & Light Company, Toledo, Ohio, has decided to convert all its cars into cars of the pay-as-you-enter type. Some of the cars have already been arranged for this system, but the fare boxes have not yet been installed.

TRADE NOTES

Frank D. Chase, Chicago, Ill., has opened offices in the People's Gas Building, Chicago, as an architect and industrial engineer, and will make a specialty of designing manufacturing plants and mercantile buildings.

Laconia Car Company, Laconia, N. H., which has taken over the Laconia Car Company Works, has elected Cornell S. Hawley president, and Craig Colgate, William L. Putnam, Harold J. Coolidge and Robert Treat Paine, Jr., directors, in addition to Louis A. Frothingham, William H. Hill, Henry Hornblower, P. L. Hughes, Henry N. Sweet, P. W. Whittemore and Henry C. Wiley. Mr. Hawley is also president and treasurer of the Consolidated Car Heating Company, Albany, N. Y.

Federal Storage Battery Car Company, Silver Lake, N. J., has orders under way for the Chicago Great Western Railway, the Chesapeake & Ohio Railway, the Cambria & Indianapolis Railroad and the United Railways of Cuba. The cars for these companies will exceed in size those for the Ephrata & Lebanon Street Railway, which are 35 ft. 1 in. long over all, and which are described elsewhere in this issue. These cars will have the usual standard steam railroad equipments required by the safety appliance laws. The Cuban order will cover a vestibuled train made up of three motor cars.

Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa.—The second annual banquet of the employees of the Westinghouse interests was held on March 16 at the Fort Pitt Hotel, Pittsburgh, Pa. About 500 of the employees of the various companies located in the Pittsburgh district were present. E. M. Herr, president of the Westinghouse Electric & Manufacturing Company, was toastmaster. The following is a list of the speakers and their subjects: A. L. Humphrey, vice-president and general manager Westinghouse Air Brake Company, "The Power of Air"; H. G. Prout, vice-president and general manager Union Switch & Signal Company, "Co-operation"; T. E. Clifford, general agent Pittsburgh Meter Company, "Gas"; George W. Guthrie, ex-Mayor of Pittsburgh, "Pittsburgh"; Guy E. Tripp, chairman board of directors Westinghouse Electric & Manufacturing Company, "Public Relations"; J. J. Jackson, attorney Westinghouse Electric & Manufacturing Company, "Entropy"; E. H. Sniffin, sales manager Westinghouse Machine Company, "Steam."

Allis-Chalmers Company, Milwaukee, Wis., will be reorganized in accordance with a plan approved by the reorganization committee on March 20, 1912. A new company is to be formed, in which the existing $11,148,000 in 5 per cent first mortgage bonds will be eliminated, the bondholders receiving preferred stock in the new company in exchange therefor and the preferred and common stockholders being permitted to join in the new organization upon payment of an assessment of $20 and $10 a share, respectively. The new corporation will have a capital stock of $42,500,000, divided into $26,000,000 common and $16,500,000 7 per cent. cumulative preferred, the latter to be cumulative beginning with January, 1913, at the rate of 5 per cent annually for two years, and at the rate of 6 per cent annually from January, 1915, to January 1, 1917, when the 7 per cent rate will go into force; but the preferred stock will receive the full 7 per cent dividend from the beginning if earned. The distribution of the stocks of the new company to existing security holders will be: For each $1,000 5 per cent bond a total value of $1,375, of which $1,000 will be new preferred, $350 new common and $25 coupon Jan. 1 in cash; for each $100 par preferred stock upon payment of $20 in cash a total value of $110, of which $20 will be new preferred and $90 new common; for each $100 par value of common stock a total value of $45, of which $10 will be in new preferred stock of $10 assessment and $35 in new common stock. The assessment will bring in $5,192,000 for working capital. It is proposed to give to the preferred stock power to elect a majority of the directors, and a voting trust is to be created of both classes of stock to run for five years.

ADVERTISING LITERATURE

A. O. Schoonmaker Company, New York, N. Y., has issued its 1912 standard price list of india and amber electrical mica.

Allgemeine Elektricitäts Gesellschaft, Berlin, Germany, has issued Bulletin No. 7, which describes and illustrates several types of its electric automatic street railway switches.

Hensley Trolley & Manufacturing Company, Detroit, Mich., has issued a catalog in which the line of trolley harps and wheels which it manufactures are described and illustrated.

Automatic Signal & Appliance Company, Cleveland, Ohio, has issued a catalog in which several types of its automatic signals for high-speed interurban electric railways are described and illustrated.

Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa., has issued Folders 4100 and 4101, covering its 1912 line of fan motors. One of these folders is devoted to alternating-current fans and the other to direct-current fans.

Boonton Rubber Manufacturing Company, Boonton, N. J., has issued a booklet calling attention to the many advantages of Boonton bakelite insulators. Two types of these insulators, which are illustrated, are for use on underrunning third-rail systems.

General Electric Company, Schenectady, N. Y., has issued Bulletin No. 4927, which describes the manufacture of that company's feeder voltage regulators. It illustrates the various processes of the manufacture and shows the facilities possessed by the company at its Pittsfield works for the manufacture of this type of apparatus.